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FOOD MANUFACTURE

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FOOD MANUFACTURE

Vol. XXIV, No. 12 December 1, 1949

Cleaner Food

ONE further step in the direction of the provision of cleaner food has been taken by the Ministry of Food by the issue of some model by-laws for the use of local authorities. The maintenance of the quality of the public's food is governed not only by the Food and Drugs Acts of 1938 but, in greater detail, by by-laws promulgated by local authorities. The function of confirming such by-laws was transferred to the Minister of Food under Article 6 (1) (*e*) of the Transfer of Functions (Food and Drugs) Order, 1948.

It was in 1939 that the Ministry of Health prepared some model by-laws, but as these have become obsolete to some extent, this new model has been issued.

The model has been designed to apply generally to all branches of the food trade, and no attempt has been made to lay down a detailed code of hygienic practice for any particular trade.

According to the by-laws "no person knowingly suffering from or knowingly being a carrier of any disease shall handle, wrap, or deliver any food so as to give rise to any risk of the spread of the disease." They require that all steps as may be reasonable should be taken "to protect the food from dust, dirt, mud, filth, dirty water, animals, rodents, flies, insects, and other sources of contamination including contamination by other persons," this applying also to open-air traders as well as restaurants and shops. Those carrying on a business in which food is handled, wrapped, or delivered in a room shall "cause to be affixed and maintained in a prominent and suitable position near every sanitary convenience provided by him for the use of employees in that business a clearly legible notice requesting such employees to wash their hands after using the convenience."

The Ministry are somewhat pessimistic about the possibility of enforcing the hand-washing by-law and feel that the observance of cleanly practices in this matter can best be achieved by education.

It is strange to contemplate that in a civilised country such education has been apparently neglected. Perhaps the Minister of Education could issue a by-law to the schools enforcing the display of similar legible notices in their "conveniences," as they are elegantly called.

Anyway, it will be interesting to note what effect these new by-laws will have on the incidence of food poisoning cases after (say) a year. That should be a reasonable test of the extent of their adoption.

Food Labelling Reforms

An account of four years' administration of the Defence (Sale of Food) Regulations 1943 by the Food Standards and Labelling Division of the Ministry of Food is contained in a recently issued report, according to which more than 30,000 labels have been submitted to the Ministry for advice during this period.

Although the Ministry does not advise on individual advertisements, much general advice has been given which applies equally to advertisements and labels, particularly in regard to nutritional claims and to suggestions as to the presence of vitamins and minerals. Food advertising has been scrutinised, with the result that, on the Ministry's representations, some advertisements have been withdrawn by the manufacturers.

This centralised administration, with the co-operation of the trade, has achieved a much higher standard of labelling and advertising than could ever have been obtained solely by enforcement action. It has dealt effectively with those marginal cases of deception which a local Food and Drugs authority must hesitate to bring before a Court but which do mislead the public. More important, it has secured the acceptance of general principles in a fraction of the time it would have taken to establish similar precedents in the Courts.

In four years the foundation has been laid of a complete reform in food advertising and labelling and of an effective control of the quality and composition of food, which will protect the consumer from exploitation not only in the present times of shortage, but in the days to come when highly competitive selling returns.

Plea for British Pig Industry

At the East Anglian Pig Conference, organised by the British Oil and Cake Mills and presided over by Mr. David Black, former manager of the Pig Marketing Board, Mr. H. L. Ruffell, a leading farmer and pig breeder, said: "This generation has been brought up on milk pap and cereal breakfast foods, and if we are going to get them to eat our products we must provide an article that will please their palate. A generation is growing up that has never tasted the pork delicacies, the real sausages, and the crisp lean bacon of pre-war years."

According to Mr. Ruffell what was wanted was a dual purpose pig for pork or bacon, weighing from 120 lb. to 170 lb. dead weight, and this must be an early maturing lean carcass.

Pigs should be looked upon as the most important department of the stock farm. They should be organised on business lines, and should have as much trouble devoted to them as is given to milking cows. Pig producers looked to the scientists to co-operate with the feedingstuffs industry to ensure that their products were not deficient in vitamins or minerals and would feed to give a good quality carcass.

There is little doubt that this country could become self-supporting in bacon and pork. In Great Britain today there was only one pig to sixteen persons, whereas in Denmark, which was overrun during the war and had to import practically all her feedingstuffs, there was one pig to two persons. Those in authority should realise the tremendous possibilities in expanding the pig industry. Surely, asked Mr. Ruffell, it would be better to import feedingstuffs and produce all our requirements of pork and bacon instead of rushing round the world at the mercy of every seller, buying inferior quality meat that other countries did not want?

Enzyme Systems of Canned Foods

The effect of processing conditions of time and temperature on the enzyme systems of canned acid foods was discussed in *Industrial and Engineering Chemistry* (**41**, 9, 2017), by Arthur M. Kaplan, William B. Esselen, Jr., and Carl R. Fellers of the University of Massachusetts.

Processing times and temperatures used for the preservation of acid foods are usually developed with the purpose of destroying or inhibiting the micro-organisms present in the foods. Through the application of procedures commonly used for determining processing conditions necessary to sterilise canned foods commercially, the effect of heat preservation upon their enzyme systems can be observed and the nature of the thermal inactivation of the enzymes can be studied. Processing times necessary to inactivate enzyme systems of canned foods at specific temperatures can thus be accurately predicted.

The authors offer an approach to the study of the possible use of an enzyme system as an indicator of adequate processing of canned acid foods, and the procedures used in their investigation should find application in thermal destruction studies of the enzyme systems of other foods and biological systems.

The initial investigation appeared to indicate that additional studies of the possibility of developing peroxidase as an indicator of adequate processing of solid acid foods, such as peaches, pears, and pickles were warranted. This statement was made despite the fact that peach and pear peroxidase appears to have relatively low thermal resistance when studied in extracts and experimental packs of *purées* of these fruits. If the fact is considered that in certain cases the internal temperature of a halved pear or peach during normal heat processing may not exceed the temperature range over which the enzyme exhibits some resistance, the reason for believing that further investigations are justified becomes apparent. Further work with cucumber pickle peroxidase is indicated on the basis of the high thermal resistance of this enzyme.

More and More Eggs?

To most people egg production is a matter of feedingstuffs; this is what they have been told since about 1940 and they can hardly be blamed for supposing that this is the whole story. That the structure of Britain's egg producing industry has changed completely since 1939/1940 is neither so obvious nor so well publicised. Mr. R. Coles, in his "Study of the British Poultry Industry" (*Agriculture*, **56**, 7, 332), has a great deal to say that goes rather deeper.

The long continued curtailment of feedingstuffs has severely reduced the ranks of the poultry specialists. Egg production has shifted more and more to the general farm. In England and Wales, where the pre-war number of specialists was very high, the poultry population is still about four million below average pre-war numbers; but in Scotland and especially in Northern Ireland big increases in bird population have been reached. In short, where general farms were formerly the main bases for egg production, recovery and expansion has been striking; only in England and

Wales, where specialist egg production had been highly developed, has recovery been handicapped.

Numbers of birds are one thing and egg production another. The decline of the specialist has led to a severe fall in the annual average output per bird. The specialist used to obtain 180 eggs per bird, and it was fundamental for commercial success to ensure that a high proportion was produced in the colder months. The general farming system is believed to reach about 100 eggs per bird per year, with 60 per cent. to 70 per cent. produced in the spring and summer months.

Until 1949, the fixed prices for eggs offered no inducements for autumn or winter egg production; there has therefore been nothing to encourage the general farmer, now the major egg producer, to follow any of the pre-war specialist's practices. Before the war, 53 per cent of the total annual income from egg production was earned in the colder months; up to April, 1949, the post-war position has been that 70 per cent. of the total income from eggs has been earned in the spring/summer months. Now that seasonal variations in prices are again operating, this output and income dominance in the "easy" months may prove to be a serious weakness in the post-war British egg industry.

Yet it is difficult to see how the general farmer with a small (under 100 birds) flock can appreciably pursue specialist methods; his egg production is a side-line, a spare-time labour task, and it is based partly upon his crop wastes. Equally is it difficult to visualise the re-emergence of the pure specialist whose activities depend so much upon availability of purchased feedingstuffs. Though the new inducements of seasonal prices may encourage autumn and winter egg production slightly, we must assume that a poultry industry now largely based upon small, general farms will continue to produce most of its eggs between February and July.

If this is indeed the trend of events, it suggests that more attention might be paid in future to methods of egg preservation. Mr. Coles, in his survey, mentions the promise of oil dipping. Can the public be persuaded to accept efficiently preserved eggs as "equal to, or little below, fresh eggs in quality"? This new field of activity for the experienced food processor and distributor, which arises directly or substantially from the total change in the structure of Britain's poultry industry since 1939, offers a two-fold task: firstly, the careful development of successful large-scale methods of preservation, and secondly, the development of public confidence in the preserved eggs.

A Shock for Fish

An invention of a German engineer for catching salt water fish by means of electricity is described in a recent issue of Oslo's *Verdens Gang*, who state that the method may bring about a complete revolution in existing fishing practices and enable an exploitation of the seas' riches on a scale never before contemplated.

Experiments in catching fish by electric methods have already been practised for some time in fresh water. It has been shown that when two electrodes are placed in the water and subjected to a certain tension and strength of current, the fish within a certain distance move towards one of the electrodes. If the tension is great enough the fish are paralysed and die. Hitherto, this has been practicable only in fresh water. In salt water, owing to its high conductivity, it has not been practicable to utilise enough energy to create an electric field of sufficient strength.

The new invention provides the solution to this problem and a vessel is to be equipped to carry out practical tests at sea. A further claim is that this method can, by adjusting the electric tension, discriminate between large and small fish so that fish above a certain size are caught.

Milk Fat Fractions in Pastries

In the course of experimentation to determine the physical and chemical properties of glyceride fractions separated from milk fat by Henderson and Jack (1944), certain differences were observed that made it desirable to determine the practicability of using some of these fractions as shortening agents in certain food products. Following on this, further experiments were made by Lura M. Morse and E. L. Jack of the University of California (*Food Research*, **14**, 4, 320 to 324).

Although butter is frequently used in the preparation of cakes, its use in pastry has been limited by the fact that butter, as such, has a relatively poor shortening power in pastry in view of its high percentage of unsaturated glycerides. In this respect, Denton and Lowe (1944) observed that moisture-free butter, drained free of curd, produced a very tender pastry. The use of milk fat fractions, free of protein, would be of particular value in the diet of individuals who are allergic to milk and its products.

In the series of experiments, the use of two milk fat fractions, precipitated from solvent at $-20°$ C. and $-53°$ C., as shortening agents in baked products was investigated. It was found that the $-20°$ C. fraction resulted in a satisfactory

cake, whether prepared by conventional or quick method, if 5 per cent. of an emulsifier were added to the fat. It was also necessary to use 37·5 per cent. more milk than in the standard recipe. The −53° C. fraction was found to be less satisfactory as a shortening agent for cake, in spite of the addition of an emulsifier.

Although experiments showed that the −20° precipitate could not be used for pastry if the conventional ice water method were used, it was found that it made an excellent hot water pastry. The −53° precipitate made an acceptable pastry if chilled to 7·8° C. to make it plastic enough to use in the conventional method. The emulsifier was not found to have any effect on the quality of the pastry produced with these milk fat fractions.

Diacetyl in Cheddar Cheese

In the course of a study of the diacetyl in cheese, H. E. Calbert and W. V. Price (*J. Dairy Science*, 515-520, June, 1949) state that a small quantity of diacetyl probably contributes to the typical flavour of Cheddar cheese, although larger amounts are associated with flavour defects.

A number of samples of Cheddar cheese and other varieties were examined for flavour by a tasting panel, and divided into two groups. The diacetyl content of each sample was determined by a modification of the Prill and Hammer method, in which the ammono-ferrous dimethylglyoximate formed was measured spectrophotometrically.

Diacetyl was found in all samples examined, the majority containing less than 0·05 mg. per 100 g. of cheese. The diacetyl content of Cheddar cheese ranged from 0·016 to 0·335 mg. Seventy-nine per cent. of the samples in the group with "excellent flavour" contained less than 0·05 mg. diacetyl.

Echoes from Italy

A short account of the Parma Food Fair is published on another page of this issue. Apart from the actual products themselves and food plant and machinery, there are one or two special points worthy of mention.

In these days of proposed longer working hours one of the things that could not fail to strike a visiting Englishman was that the Fair officially remained open until midnight, when all the stands, with very few exceptions, were still attended and doing business. There is nothing extraordinary about this as all Italy seems to be working long hours. Building, decorating, painting, and markets are carried on at all hours except between midnight and 6 a.m., and are even continued with apparent enthusiasm on Sunday afternoons.

Another remarkable fact is that one hall was nearly full of American canning and preserving plant, while British food equipment was almost conspicuous by its absence.

Replies to enquiries as to the reason for this were somewhat vague. While American manufacturers flood the country with offers of plant and copious literature describing it, very little is received from Great Britain. "Perhaps," said one Italian authority, "British manufacturers are too full up with orders." Another suggested that the currency problem was militating against this class of business between the two countries. British manufacturers will doubtless know the answer.

St. Martin's Feast

While November 11 is remembered as Armistice Day, it is also the feast of Martinmas. Today, St. Martin's Feast is almost forgotten; in any case it would be difficult to celebrate appropriately in times when food—of the right kind for the occasion—is scarce. The story goes that the white horse of St. Martin, that bishop of Tours noted for his compassion for the poor, was supposed to have left its shoes behind when the saint was riding by night; what more fitting, therefore, than that housewives should make horseshoes, some filled with jam, covered with nuts, others with cinnamon, marzipan, and icing?

Since a few geese are pictured on the shrines of St. Martin, dinner on the feast day was roast goose, dumplings, and then more of the rich pastries. St. Martin's Feast was a holy day in church, but not much of a holiday at home for the housewife or mother.

Perhaps, after all, it is just as well that we have only Santa Claus and not two saints to honour in these austere days. The children could certainly do with a little more of that feasting which becomes so eventful in their lives. But with doubts concerning supplies of marzipan and nuts, and even more so with geese, they can have only one grand treat at the end of the year!

It is with pleasure that we are able to announce that, commencing with the January 1950 issue, FOOD MANUFACTURE will revert to its former size of page which, owing to wartime paper economy, was reduced in March 1942.

The Cornish Pilchard Canning Industry

J. R. BURRELL

The history of the pilchard industry in Cornwall goes back several centuries, but it is only comparatively recently that these fish achieved popularity in Great Britain. An account of the processes involved in canning is included in this survey of the industry as it stands today.

THE Cornish pilchard season usually lasts from June to January, which is a longer period than is the case with other fish preserved at the landing point, and therefore allows greater scope for canning.

Pilchards in fair condition may be caught at periods even during the four months off-season, but in most cases such fish are immature and quite unsuitable for canning.

Locally known as "winks," these pilchards are without flavour, have a very low oil content, darken the tomato sauce, and emerge after canning as a mixture of skin and bone, which is quickly reduced to a pulpy mass following transportation of the finished pack.

In past times the fishing fleets of St. Ives, Penzance, Looe, Mevagissey, Porthleven, and other places on the Cornish coast were large, but at the present time there are probably less than one hundred boats operating for pilchards in the whole of Cornwall.

The demand in the past was mainly from Italy, the fish being marketed in a pressed and salted condition in hogsheads, each containing about 2,500 fish.

Fluctuations in Demand

Very large catches have been recorded; a daily receipt in the region of 30 million at one port alone was once recorded half-way through the nineteenth century. However, the demand gradually declined through the years, reaching its minimum just prior to 1939. During hostilities, however, the demand increased somewhat and, at the moment, the industry is in a state of flux.

The Cornishman has always preferred his pilchards in the Cornish marinated style, so that presumably a canned product prepared similarly should have a market in the south-west.

The method of cooking is similar to sousing, as practised elsewhere for herring and mackerel, except that the cooking process is prolonged, the fish being placed in a dish with vinegar and spices, and cooked in a slow oven for some hours, until the bones are completely softened and decalcified.

The home demand for pilchards is so great today that an increased number of boats will be required to satisfy it, but fluctuations of demand in the past have had the result of making the Cornish fisherman chary of fitting out his boat with the necessary equipment for making large catches.

However, times have changed, and with the growth of a canning industry, it is to be expected that the fishermen will come to realise that it will be worth their while to invest in the necessary equipment for catching the pilchard in quantity.

A few of the more adventurous spirits have ordered ring nets, which are thought to be the most economical for large-scale fishing; some boats have already been fitted with these instead of the usual drift nets.

There has been a great deal of discussion concerning the relative merits of the ring net and the drift net, and although it is generally conceded that the ring net—worked by two boats, and helped by the echo-sounder—would have greater catches than

The pilchards are first headed and gutted by machine.

On removal from the brine, the fish are drained and removed to the packing table.

would the drift net, it is also known that the drift net screens the fish, catching only those above a certain size, whereas the ring net catches all and sundry.

It has been stated that the smaller fish are admirably suited to canning, but this is not necessarily so, unless the cannery at the receiving end is suitably equipped with machinery for "sardining" them when they are caught.

There is a general impression that the pilchards caught nowadays are smaller than those caught some years ago, and an authority on the subject, in support of this point, has declared that the mesh size of the drift nets has decreased of late years.

Future of the Industry

Canning is not at present, at all events, the whole of the answer to the revival of the Cornish pilchard industry, for catches may be so phenomenally large that disposal by canning alone would not absorb them.

The ideal system would be to quick freeze the surplus for canning when weather conditions are such as to prevent the boats from putting out to sea; although this system is not generally regarded as a solution on economic and other grounds, one concern is successfully using it.

Pilchard Canning

The processes involved in canning pilchards are similar to those used for herring, but there is one main modification owing to the number and toughness of their scales, which are more difficult to remove than are those of herring, and it is more imperative that they should be completely removed. The processes concerned are:

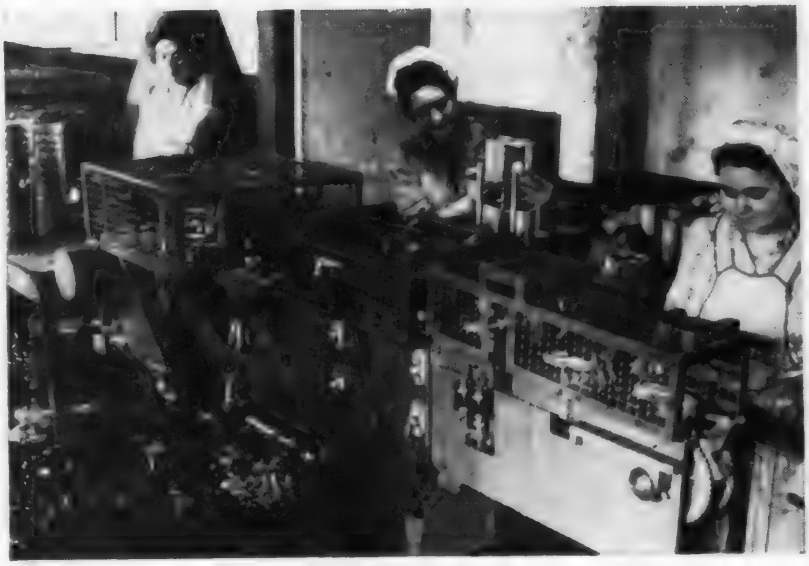
1. Scaling and preliminary washing.
2. Heading and gutting.
3. Further rapid washing.
4. Brining or rousing.
5. Saucing and packing.
6. Clinching.
7. Exhausting.
8. Double seaming.

The clincher head.

Washing and Scaling

The pilchard varies in the extent to which it may be handled, the best all-round method of scaling being to remove the bulk of the scales prior to heading and gutting while the fish is whole and unweakened, and then to remove the rest which have been loosened by either the manual or mechanical action of heading and gutting. The operation must be carried out in minimum time and be carefully controlled.

In the washing machine, one type of which is an open drum-shaped receptacle, with a revolving disc at the bottom, serviced with jets of water, the fish are forced round by the rotating action of the bottom table to meet two directional plates, which induce them to move and turn, one against another. The removed scales fall with the water to the bottom of the receptacle, and through a $\frac{3}{16}$ in. gap, between the cylindrical wall and the table. The water is used in a generous flow, and about four stones of fish are fed in. The machine is started, and after approximately twenty seconds for soft fish and a minute for firm fish, the front door is opened and the scaled fish are caught in a basket or stainless steel drainer.



Filled cans pass through the clinching machine.

Heading and Gutting

Opinions are divided as to whether the hand or mechanical operation is best for heading and gutting, but manual handling of these smallish fish is laborious and expensive, and the machine is eventually bound to supersede the hand operation.

In order that the machine may do its work adequately the fish must be similar in size, as the nobbing and gutting machine has to be set according to the size of the fish with which it is dealing. If, on the other hand, there is a great variation in size, the fish are best treated by hand, for although the machine will decapitate the fish, the deep, firmly held gut will not be extracted.

The headed and gutted fish are rewashed prior to brining.

Brining Operation

Brining is normally carried out in batches in tanks, but a continuous briner may be used with advantage.

Brining may be carried out by the use of any particular concentration of brine, but saturated brine produces a firm fish by expression of liquid from the pilchard by osmosis, whereas when a weak brine is used, some is actually absorbed by the fish. In the first case the fish will be somewhat firmer than in the second, but the yield also will be less. However, in actual working it is found convenient to use saturated brine, the operation taking from fifteen to forty minutes, according to the size and condition of the fish.

The larger the fish and the greater the oil content, the longer is the immersion. To maintain the brine constantly at saturation point, it is necessary to keep an excess of solid salt in the tanks, and the contents must be vigorously stirred between operations. The addition of a few scoopfuls of salt after immersing each batch of fish will not be sufficient, as really energetic action is necessary to convert into brine the water expressed from the fish.

Effects of Rousing

Rousing, which entails thorough mixing of the whole fish with about 5 per cent. of its weight of dry salt and leaving it to act for some hours, is not resorted to a great deal in the case of pilchards as it tends to tighten up the outside tissues of the fish, making subsequent removal of scales more difficult than usual. It is useful, however, in cases where fish has to be left overnight as, being adequately salted, it needs no brining and is ready for use following heading, gutting, and washing.

On removal from the brine, the fish are drained and removed to the packing tables, where they are weighed out according to the size of the cans to be packed.

After exhausting, the cans are fed to the double seamer.

The filled cans are either closed under vacuum, or clinched and then exhausted in a steam exhaust box as a preliminary to double seaming and steam sterilising.

There are certain necessary precautions to be taken when the fish are received into the factory. The heading, gutting, and brining station should not be adjacent to the boiler or in the same department as the steam exhausters and retorts. The temperature of the store should be as low as possible, as a few degrees of temperature may make all the difference to the condition of the fish.

When fish become soft and mushy, owing to proteolysis and bacterial breakdown, gas is evolved which tends partially to offset the exhausting process and may give rise to buckled or swollen cans through the excessive internal pressures developed in the subsequent steam retorting.

This may be especially noticeable in cases where the cold vacuum closing process has been followed, for whereas in the steam exhausting the heat drives out most of the gas from the tissues, in the vacuum-closed cans there has been no heat treatment prior to the sealing of the tin.

Preparation of Sauce

The most popular sauce for pilchards, as for herrings, is the tomato variety. The normal sugar-sweetened product sold for table use is not used because the high temperature of the cooking and sterilising process in the presence of acid would caramelise the sugars, and so produce a dark brown sauce.

The actual sauces used for canned fish are compounded mainly of tomato *purée*, acetic acid, and spices, and a tomato *purée* is chosen which keeps maximum red colour and sweetness and has minimum bitterness after cooking with the fish at a temperature of 240° F.

A *purée* cannot be used on the basis of its appearance, colour, flavour, texture, and taste as it is received in the container from its place of origin, for the many varieties react differently to heat in the presence of fish.

Poor fish and fish that have been kept too long in a warm place will discolour even the best *purées*. Experimental samples of fresh and poor fish, both put up with tomato in tins and given the normal heat treatment, proved this conclusively, for whereas the colour of the sauce in the first was bright tomato red, in the second it was very much like Worcester sauce.

The concentration of the *purée* solids in the finished sauce is usually about 15 per cent.

Vacuumising Process

The vacuumising process ensures a certain reduction in the internal pressure produced in the can during processing and also such a degree of vacuum after processing as to ensure satisfactory collapse of the ends of the cans.

In the past it was thought necessary to have a partial vacuum in cans to slow down or prevent the development of micro-organisms and "getting the air out of the tin" was the main object of the old rule-of-thumb processing. As removing the air meant using a great deal of heat, it was fortunate that something like sterility was often attained.

However, since the most dangerous micro-organisms develop only in the absence of air, this old theory has long gone by the board, and the function of the exhausting process has come to be recognised as a simple method of reducing internal pressures during heat processing, which therefore reduces the chances of strained seams and leakers, peaked, buckled, or puffy cans. Also the can being slightly concave at both ends is its own indication of general soundness, and any deviation from this state is shown by swollen tops and/or bottoms.

The exhausting process, other than the cold

vacuum process, takes various times according to the type of exhauster used, but where numerous steam jets impinge directly into the cans as they pass through it, from six to twelve minutes is the usual period. In other cases it may take twenty or more minutes.

The shape of the can and rigidity or otherwise of its structure are two of the factors that affect the vacuum, 7 to 9 in. of vacuum on a shallow oval fish can being comparable to a much-increased vacuum on a taller cylindrical can. It is therefore rather difficult to lay down a definite vacuum to be aimed at in cans of pilchards, but as an approximate guide it should be 8 in. in the case of oval cans and 12 in. in the case of the A1 tall cans.

No clincher or exhauster is required in the cold vacuum process. A vacuum pump is attached to the machine or battery of machines, and vacuumising is carried out during the closing operation. It saves space and steam, but the machines are slower in operation than the usual seamers, and in cases where the weather has been unusually warm and the fish somewhat gassy, they are not quite so effective in attaining the necessary degree of vacuum as is the steam-exhausting method.

Retorting

The pilchards usually being cooked in an acid sauce, the sterilising process is facilitated to some extent as bacteria are killed at comparatively low temperatures when in an acid medium.

However, this cannot be laid down as a definite rule as (*a*) the sauce is a minor constituent, and the acidity of the pack as a whole may not be high enough to be effective; (*b*) the fish needs a thorough cooking to achieve the desired flavour and to soften the bone; and (*c*) the acid constituents take some time to permeate the fish, and bacteria might develop in parts of the flesh where permeation has not been complete.

As a general rule the 14 oz. oval cans are given times varying between fifty-five and sixty-five minutes at 239° F., the A1 tall cans seventy to eighty minutes, and the small (7 oz.) oval fifty to sixty minutes at the same temperature.

The Compleat Butcher

THE general editor of a newly published encyclopedia in two volumes,* Mr. Frank Gerrard, states in his preface that the meat industry is a career for the *enthusiast*. That he himself is one is evidenced by his activities on behalf of the trade and the excellent books he has written.

By virtue of his position as acting principal of the Smithfield Institute, now called the Smithfield College of Food Technology, and instructor of the embryo butcher, he is deeply interested in improving the status of the craft by means of proper training, and he never ceases to urge those starting on their career to acquire all they can from practice, but to supplement this knowledge with technical training, and to have as their target the certificate of the Institute of Meat.

The two encyclopedic volumes for which Mr. Gerrard has made himself responsible, although written mainly to serve as a textbook for students studying for the Institute's certificate, deal comprehensively with every aspect of the trade. To produce this work he has gathered together seventeen experts, whose contributions range from the pathology of meat to butchers' book-keeping.

The work is well balanced and the illustrations are apposite and well produced.

* *The Book of the Meat Trade*. Edited by Frank Gerrard, M.Inst.M., M.Inst.R., M.R.San.I. Vol. 1, pp. 313+xi. Vol. 2, pp. 277+vii. The Caxton Publishing Co., London. Price £2 17s. for cash or £3 by instalments of 6s. on delivery and 6s. monthly.

British Seaweeds

THE fact that agar is indispensable in the preparation of bacteriological media made it desirable that all belligerent countries should have a local source of this substance. In the early days of the last war, therefore, preliminary investigations were made on the suitability and distribution of certain red seaweeds in Britain. The results of this survey have now been published in book form.*

Subsequently *Gigartina stellata* Batt. and *Chondrus crispus* (L.) Stackh. were selected for detailed investigation. The chemical research, under the sponsorship of the Vegetable Drugs Committee of the Ministries of Health and Supply, was carried out by Dr. S. M. Marshall and Dr. A. P. Orr, both members of the staff of the Scottish Marine Biological Station, Millport; the botanical work was under the direction of Prof. L. Newton of the University College of Wales, Aberystwyth.

Seaweeds were harvested from the west of Scotland, Wales, Devon, Cornwall, and Northumberland, and the book includes an account of the many uses of agar and of the way in which other belligerent countries met the need for a supply of this essential product.

The botanical and chemical research that led to the production of a good bacteriological agar in Great Britain is described, and a record is given of the surveys which were carried out, together with an account of the methods of harvesting the seaweed.

This well-produced book is illustrated by maps, graphs, and diagrams, as well as by plates, both in colour and monochrome.

* *A Study of Certain British Seaweeds and their Utilisation in the Preparation of Agar*. By S. M. Marshall, L. Newton, and A. P. Orr. Pp. 184+viii. H.M.S.O., London. Price 27s. 6d. net.

Peeling Fruit by Electric Furnace

L. SHIELDS, B. Sc.

English canned fruit has during recent years found a ready home market. This encouraging growth in popularity since the difficult pre-war years is to some extent merited by improved quality but is also owing, in some measure, to the scarcity of the best U.S. and Canadian packs. The time is now opportune for canners in this country to produce from the most prolific home-grown fruits high-grade packs comparable in appearance and flavour with those of overseas competitors, and any device designed to that end is of interest.

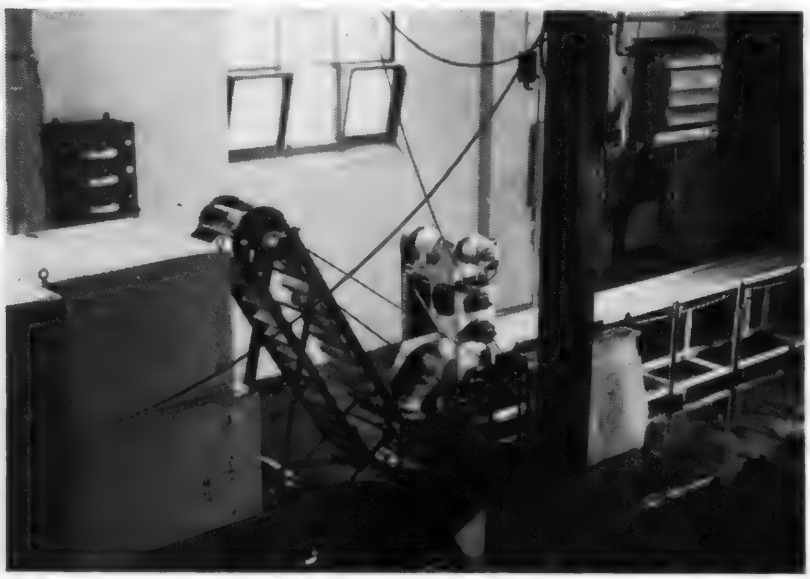
A PROCESS which points the way to new progress has been developed in the Stockport factory of Pickering's Produce Canners, where an electric furnace has been installed for peeling fruits and vegetables in bulk. It is the first commercial application of a new principle (for which a patent is pending) and is the result of two years' experimenting on a substantial scale.

The idea was originally to remove, by mechanical means, the stringy skin of rhubarb. Attempts to use caustic soda and other cauterising substances were unsuccessful, but the problem was solved by plunging the rhubarb into a white-hot laboratory muffle furnace and then quenching it under cold water. Within a few days, the experiments were extended to other available fruits and vegetables with equally encouraging results. Canning tests established that the fruit suffered no degradation in flavour by this apparently severe treatment, and demonstrated the superiority of the peeled product in all cases. Uniformity of colour, absence of blemishes, and rapid penetration of sweetness were obvious advantages.

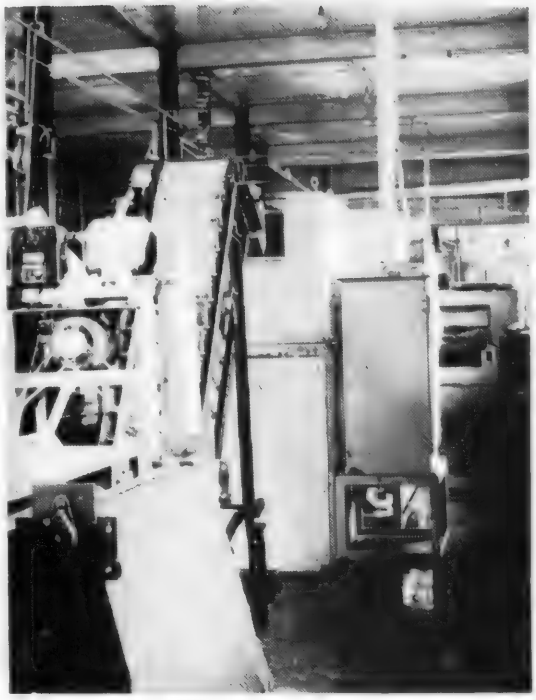
About the same time, the interest of canners had been aroused by a demonstration of "peeled plums" at the Campden Research Station. The samples had been prepared in their laboratories by experimentation on lye peeling. The respective merits of the two processes were examined concurrently at the factory, the furnace method being more favoured because of its wider application.

Rather than waste time on constructing a pilot plant, the manufacture of a full-scale furnace was commenced. This was to be heated electrically, thus ensuring cleanliness and ease of control. The objective was a capacity of one ton per hour, sufficient for the customary sixty per minute canning line. Not unexpectedly, this first machine justified itself more by the lessons it taught than by the work it produced. It did, however, enable a fair quantity of peeled plums and peeled rhubarb to be marketed during the 1948 season in order to test consumer reaction, which was most favourable.

During the 1949 season a more powerful and greatly improved furnace has been used. It has proved adequate for dealing with one ton of plums or apples per hour, and, by making slight modifications, it is expected that this capacity will be substantially increased. Automatic control equipment ensures that steady temperatures up to 1,000° C. can be maintained within the furnace, and by means of a variable speed conveyor the period



The fruit is fed into the furnace from a bucket elevator.



The front end of the furnace, with the electrical switchgear on the right.

of immersion in this intense heat can be varied from ten to sixty seconds.

The optimum conditions are determined by the maturity and type of produce being treated. It was observed that the skins of ripe plums and peaches burst and retracted immediately on entering the heat zone, and were subsequently removed with remarkable facility. Hard green apples and most vegetables required a more severe heat treatment. The skins were ignited and charred completely without adversely affecting the flesh beneath. After a combined washing and mild abrasion process, the fruit required only a cursory inspection before being passed to the coring and cutting machines.

For peeling plums by a continuous process, the fruit, after stalking and selection on the first preparation belt, is fed into the furnace from a bucket elevator. It is conveyed through the heat zone for a brief, controlled period and then discharged into a water flume. Pressure sprays and certain ancillary devices are used to remove and dispose of the disrupted skins, final inspection and packing being accomplished on a second conveyor band, this requiring from twenty to twenty-five female operatives.

Economic aspects of the process have been carefully watched. It was soon apparent that full production could be maintained only when plums were selected for size and maturity, not a serious difficulty when small and other unsuitable fruit could be diverted to the second and faster canning line. When due regard was paid to this principle of grading, neither fuel nor labour costs were excessive. Waste was necessarily greater than in the ordinary canning procedure. Part only was attributable to skin removal, the rest being accounted for by the rigorous elimination of sub-standard material. Taking all factors into consideration, and allowing for outlay on the additional plant, the venture was sound and the prospects are promising.

Further applications of this new technique are expected in the near future. The peeling of apples and pears is readily accomplished by this method, a decided improvement on existing mechanical devices. Peaches and apricots can be peeled without the use of caustic soda, the product being firm and suitable for pitting and trimming. The same furnace, once installed, can be used to char the skins of onions, potatoes, and carrots, rendering them easily removable by a light abrasion process. In most cases the merits of the method will be compared with those of machines already available, but where no satisfactory process formerly existed, *e.g.* for peeling plums, the improved pack will be its justification.

Acknowledgment.—The rapid and successful developments reported in this article would not have been possible without the invaluable collaboration of Mr. A. Reeves, cannery manager, and the directors of Pickering's Produce Canners, Ltd., which the author gratefully acknowledges.

Discharge end of the furnace, showing improvised equipment for disposing of disintegrated skins.

Australia's Shark Liver Oil Industry

With the outbreak of war in 1939, Australian imports of cod liver oil from Britain and the United States were cut practically overnight. Cod liver oil being one of the most potent natural sources of vitamin A, an alternative oil had to be found in order that Australian requirements could be met.

THE Australian Commonwealth Scientific and Industrial Research Organisation, together with various defence authorities and Nicholas Pty., Ltd., the Australian pharmaceutical manufacturers, began extensive laboratory work. Research revealed that the liver of the snapper shark, abundant in southern Australian waters, produced an oil high in vitamin A potency.

Birth of the Industry

A pilot plant was set up at Melbourne, Victoria, to produce enough vitamin A oil from the shark liver to meet the nation's demands. However, the requirements of Allied forces and civilians in Australia soon exceeded the output of the experimental plant. The Nicholas interests then decided to form Australian Fish Derivatives Pty., Ltd. A director visited the United States, and on his return to Australia supervised the building of one of the most up-to-date plants of its kind in the world.

A 74-ft. 100-ton ketch, which is typical of the sturdy boats used for shark fishing.

The company subsidised fishermen in the modernisation of their equipment. It also financed a personal accident insurance scheme for the benefit of the dependants of skippers and crews.

In Australian waters, edible sharks are found only in the cooler seas off the Victorian, Tasmanian, and South Australia coast, south of a line drawn roughly between Perth and Sydney. The main shark-fishing area stretches from Lakes Entrance, Victoria, to Ceduna in South Australia and along the north coast of Tasmania. The grounds have lately been extended along the coast of New South Wales and the south-eastern coast of Tasmania.

Weather in Bass Strait, between Victoria and Tasmania, can be as rough as any in the world. The craft working the strait are mostly 120 ton well-boats, measuring up to 75 feet in length, with crews averaging three to five men.

Sharks are caught with long lines and hooks, there being at least 2,500 hooks in a normal "set." Before a shark-boat skipper shoots £300 worth of hooks, lines, and anchors to lie in 40 fathoms, he must be first assured of eight hours' favourable weather, or run the risk of losing his gear.

On a typical Australian shark-boat at San Remo, Victoria, the crew's work begins about 10 a.m., when the local barracouta fishing boats return with their morning's catch. The sharkmen buy three or four boxes of this fish, which is cut up and used for bait.

By 5 p.m. the shark-boat has put out to sea and cleared the cape at the entrance to San Remo. With the cape astern, the log-line goes over the side. The log-line boxes are stacked along the starboard side of the well ready for shooting at dawn. Just before dawn the boat arrives at the grounds, eighty miles out to sea in Bass Strait.

Landing the Sharks

With the vessel steaming through the darkness at four knots, the sharkmen begin their tricky job of shooting some 2,500 hooks over the side. Generally the hooks are spaced up to 18 feet apart on the lines. Behind the man shooting the line stands another member of the crew waiting to cut the line if a hook fouls. The lines are shot in lots of a thousand, anchored, and buoyed at each end. By 9 a.m. the last buoy has gone over the side and

Cleaned and headed edible shark bodies being stacked on a carrier.

the ship heads back to the start to round up on No. 1 buoy.

By the time the last hook is aboard the task of gutting some 500 snapper and gummy shark starts.

The shark are still alive when they are lifted out of the ship's well. Had they been allowed to die on deck their flesh would have been red and second-grade in the market; kept alive, their flesh does not deteriorate. After gutting, every shark goes back into the well, where the salt water firms and whitens the flesh.

On arrival at port, the livers are forwarded to the factory, while the flesh is sent to the market to be sold. When livers reach the factory they are processed for the oil.

In the processing method, the liver is cleaned and minced by an electric mincing machine. The mass is then placed into autoclaves and digested under pressure.

The processed material from the digesters contains oil, tissue, protein, and water. To separate the oil, the material is treated in a centrifuge which separates the lighter material from the heavier. The oil flows from one pipe while the water is discharged through another.

Shark livers being processed at a Melbourne oil extraction factory.

From here the oil is further treated by a process known as winterisation to remove the stearin which still remains. Unless this is taken out, the oil will at certain temperatures throw down a whitish precipitate and become cloudy. However, this stearin contains vitamins and is not wasted.

Winterisation consists of the gradual reduction of temperature, resulting in the

separation of the stearin. This is then removed by a pressure filter and the oil is collected and stored ready for sale. The stearin is further processed and used for various products.

In the laboratory, the oil is assayed for vitamin potency and a certificate issued with every batch produced.

For the routine determination of vitamin A in fish oils, two methods have been elaborated to take the place of the lengthy biological estimation. One depends upon the reaction of vitamin A with an excess of antimony trichloride to give a blue colour of which the intensity is proportional within certain limits to the amount of vitamin A present, while the other takes advantage of the fact that light of a certain wavelength is absorbed by vitamin A in solution, the amount of light absorbed being a measure of the strength of the solution. It is the latter method that is used in the factory.

The application of sound scientific methods has enabled the industry to provide supplies of a product equivalent to cod liver oil, and in addition has made available considerable quantities of concentrates which were urgently required during the war years for the fortification of foodstuffs and the manufacture of medicinal preparations.

Production of high vitamin potency shark oil in Australia was equivalent to about 40,000 gallons during the past year. This figure includes 17,000 lb. of unprocessed livers shipped overseas.

Most of the oil produced is used by Australian firms for the fortification of stock and poultry foods and for pharmaceutical products.

Fruit and Vegetable Research

In his introduction to the annual report of the Campden Fruit and Vegetable Preservation Research Station for 1948, Mr. F. Hirst, the Director, states that research work has, on the whole, been concerned with problems of an industrial rather than of a purely scientific nature. Attention has also been given to improving the quality of British canned fruits and vegetables.

The work of the Advisory Service has continued on the usual lines, the voluntary system of quality control operating successfully during the year under review. The Station has continued to act for the Ministry of Food in supervising the work of the Ministry's Inspectors and in examining canned beans in tomato sauce for quality and composition.

A number of canning, bottling, and quick freezing trials and other practical experiments were made during the year dealing with varieties of fruit for canning and quick freezing, the effects of organic spray residues on blackcurrants, vitamin C in blackcurrant pulp, vacuum in cans, fruit gumming of plums, quality of canned peas, discoloration of canned vegetables, and texture of processed peas.

Four papers are included in the report. One, dealing with the estimation of maturity of canned green peas by W. B. Adam and F. Brown, describes the trials made to show the rate of change of texture and mealiness of four varieties of green peas during ripening, and to indicate which of several objective methods of measuring the degree of maturity of canned peas agrees most closely with estimates based on tasting tests. Good results were again obtained with crushing tests, and fairly good results with brine flotation and determination of alcohol insoluble solids. Some observations were also made on the amylose-amylopectin ratio in the starch of the peas during ripening.

Significance and control of initial infection in canned vegetables was the subject of a paper by T. G. Gillespy, in which he states that it is believed that a considerable and general reduction in the present average initial infection in cans is attainable, and, in anticipation of such a reduction being observed, it is felt that experiments should be made to test the possibilities and advantages, if any, of shorter processes in vegetable canning.

Another paper by the same author follows on previous work in connexion with the heat resistance of the spores of thermophilic bacteria.

A final paper, by G. H. Beaven and F. Brown, consists of notes on the pectic enzymes of *Bysochlamys fulva*.

Factory Welfare

The human side of industry is today receiving increasing attention, and the importance of the safety, health, and welfare of workers is indicated in a recent book* which will be of interest to all associated with industrial management.

As Mr. G. P. Barnett, H.M. Chief Inspector of Factories, says in his foreword to the book, the elimination of conditions which so often render the job at machine or bench hazardous, unpleasant, monotonous, and even lacking in comfort, is an important contribution towards the ideal of pleasure in the workshop's daily toil.

Included in the book are chapters dealing with such matters as sanitary conditions, heating and ventilation, lighting efficiency, factory maladies, and accidents, while another contains an outline of the Factories Act of 1937.

Two appendixes deal with voluntary societies and bibliography.

The book makes a contribution to the understanding of present-day industrial problems. One slight criticism is the omission of a list of contents, which could be incorporated with advantage.

* *Factory Well-being*. By C. Conway Plumbe, B.Sc. (Lond.). Pp. 138+vi. Seven Oaks Press, London. Price 12s. 6d. net.

Sulphite in Dehydrated Fruits and Vegetables

R. W. MONCRIEFF, B.Sc., F.T.I., F.R.I.C.

It is well known that the presence of sulphite in dehydrated fruits and vegetables decreases the rate of discoloration or of "browning"; in addition the presence of sulphite during the actual dehydration process is beneficial to the retention of a good colour. Unfortunately it is found that the sulphite content of dehydrated fruits and vegetables gradually falls off during storage and eventually all sulphite disappears; when this happens, the rate of discoloration accelerates considerably. The diminution in sulphite content appears to be due to the gradual reaction of the sulphite with constituents of the dehydrated food. It has been shown that a modification of the method of processing will greatly retard the reduction in sulphite content, but as this may be at the expense of valuable elements in the food further investigation may be desirable.

IT is highly probable that sodium bisulphite combines with the aldehydes and ketones which are among the most important of the flavouring principles present in fruits and vegetables. In so far as the preservation of colour is concerned, the sulphite may function primarily as an antioxidant; so long as it is present no oxidative changes can take place, but when it is exhausted oxidation and deterioration of colour set in. Whatever the mechanism of the action, it is well established that the presence of sulphite does protect dehydrated fruits and vegetables from discoloration, that the sulphite is gradually lost on storage, and that once this has happened, then discoloration ensues much more rapidly. Consequently an understanding of the processes by which the sulphite is lost is of interest to manufacturers.

Dehydrated Apricots

One of the first systematic investigations of the problem was carried out by Stadtman, Barker, Haas, and Mrak.[1] They found that as the temperature of storage was increased, the rates of darkening, of sulphur dioxide disappearance, of carbon dioxide production, and of oxygen consumption all increased. Tests were made on blanched Royal apricots, containing 23 per cent. moisture and containing 5,350 parts per million sulphur dioxide, canned in air. Five cans, each containing about ½ lb. fruit, were stored at temperatures of 49° C., 41·8° C., 36·7° C., 27·8° C., and 22·2° C. After various periods of time, cans were removed from storage; the colour, sulphur dioxide content, and the oxygen and carbon dioxide in the can were determined.

Colour Changes

Change in colour increased rapidly with increase in storage temperature. At 49° C. the storage life was only 16 days, whereas at 28° C. it was 312 days. In general an increase in temperature of 10° C. quartered the storage life. It could be predicted from a rapid assessment of the storage life at 49° C. what the storage life at 22° C. would be; at the lower temperature it was of the order of forty times as long as at the higher temperature. This enabled an assessment, useful for industrial purposes, of the safe storage life of a batch of fruit to be made in a matter of a fortnight by an accelerated test at 49° C.

Sulphur Dioxide Content

It was found that at any one temperature the logarithm of the sulphur dioxide content when plotted against the storage time gave a straight line. This indicated that the reaction responsible for the disappearance of sodium sulphite approximated to a first order reaction.

The times taken for the sulphur dioxide content to fall from 5,350 to 1,000 parts per million at various temperatures were as follows:

Temp.	*Time in days for SO_2 content to fall from 5,350 to 1,000 p.p.m.*
49° C.	27
41·8° C.	48
36·7° C.	90
27·8° C.	285
22·2° C.	700

The rate of disappearance of sulphur dioxide increased about four times for each 10° C. rise in

temperature. The production of carbon dioxide and the oxygen uptake also increased rapidly with rise of temperature.

Effect of Drying Temperature

Investigations showed that provided the moisture content was taken not lower than 25 per cent. drying temperatures up to 71° C. did no great harm, but that if the moisture content were taken much below this figure it was desirable that the final drying should be done at lower temperatures within the range 25° C. to 40° C., *i.e.* the initial drying could be safely conducted at 71° C. until the moisture content fell to 25 per cent., and after this point the drying temperature should be progressively reduced.

The outstanding results that emerged from this work were:

1. The rate of discoloration runs parallel to the rate of sulphur dioxide loss.
2. Both are increased fourfold by a temperature rise of 10° C.
3. Drying to 25 per cent. moisture could be carried out safely at 70° C.; further drying necessitated the use of lower temperatures.

Dehydrated Vegetables

An extensive investigation of the loss of sulphite in relation to dehydrated vegetables has recently been reported by Legault, Hendel, Talburt, and Rasmussen[2] of the Western Regional Research Laboratory. The vegetables that they selected for investigation were carrot, white potato, and cabbage, and the rate of loss of sulphite was correlated with moisture content, temperature, and the atmosphere in which the dehydrated vegetables were stored.

Estimation of Sulphur Dioxide

The sulphite content of the samples was determined by the method of Prater, Johnson, Pool, and MacKinney,[3] and is reported as parts of sulphur dioxide per million parts of moisture free solids. The method is essentially as follows.

Two 8 gram samples of the dehydrated vegetables are transferred to titration vessels fitted with slow-speed stirrers. 400 c.c. water and 5 c.c. 5 N. caustic soda are added to each and the mixtures stirred. After twenty minutes the mixtures are acidified with 5 N. hydrochloric acid, using 7·5 c.c. for cabbage, carrots, or potatoes, and 6 c.c. for dried apricots, apples, or peaches. To one of the samples 40 c.c. acetone is added; it is allowed to stand for ten minutes and is then titrated with 0·05 N iodine solution using 10 c.c. of soluble starch solution.

This titration gives a measure of the reducing substances other than sulphur dioxide. The end point is reached when with stirring a blue colour flashes through the mixture and persists for a few seconds; the end point is fleeting because the acetone bisulphite complex yields a small amount of sulphur dioxide by dissociation if allowed to stand —consequently the disappearance of the blue colour after a few seconds must be ignored. The second sample is titrated immediately with 0·05 N iodine solution using 10 c.c. of soluble starch as indicator. This titration gives a measure of the total reducing substances including sulphur dioxide. By difference between the two titrations the amount of sulphur dioxide present is calculated. The method was compared with other known methods of sulphur dioxide estimation, and was tested by adding known amounts of sulphur dioxide to dried vegetables and then estimating it. It was concluded that it gave results the accuracy of which were comparable with those given by the more laborious distillation methods.

Method of Moisture Determination

The method used by Legault *et al.*[2] was that which Makower, Chastain, and Tielsen[4] had found most satisfactory. This consisted of the use of an oven maintained by a vacuum pump at a pressure of 5 mm. mercury or less, *i.e.* at a fairly good vacuum. Suitable drying times and temperatures (for total moisture content tests) were found to be:

	Temp.	*Hours.*
Carrots	70° C.	29-35
Cabbage	60° C.	22-40
Potatoes ..	70° C.	43-67

If, however, forty hours at 70° C. was chosen for both carrots and potatoes, only a very small error would be introduced.

Sodium Sulphite and Mashed Potato Powder

Burton,[5] at the Low Temperature Research Station, Cambridge, found that the rate of development of brown colour in mashed potato powder begins to increase rapidly with temperature above 25° C. and with moisture content above 5 per cent. These findings are in line with other general conclusions discussed in this article. Burton found also that substances capable of reacting with the aldehydic or ketonic groups in hexose sugars might be effective retarders of the development of the brown colour; *e.g.* both sodium sulphite and hydroxylamine hydrochloride were effective in retarding the discoloration, the former in concentrations of 400 to 1,900 parts per million, the latter in concentrations of 2,000 to 10,000 parts per million. The sulphur dioxide would form the bisulphite complex with the carbonyl group of the aldehyde or ketone; the hydroxylamine would form the oxime.

Legault *et al.*[2] found that with a constant moisture content, there was a linear relation between the logarithm of the sulphur dioxide content and

the time of storage; this was in good agreement with the work of Stadtman *et al.*[1] on dried fruits.

They found that the "specific reaction rate" (which is proportional to the slope of the straight line obtained by plotting log. SO_2 against time of storage) was very much higher at higher temperatures. Three typical cases will illustrate this:

Vegetable.	*Moisture content on moisture-free basis.*	*Initial sulphite content.*	*Temp.*	*Rate of loss of sulphite.*
Carrot ..	8·0	2,190	49° C.	0·11000
			38° C.	0·01500
			24° C.	0·00090
Cabbage ..	3·2	930	49° C.	0·04700
			38° C.	0·00042
			24° C.	0·00002
Potato ..	9·2	340	49° C.	0·11000
			38° C.	0·01700
			24° C.	0·00140

It will be seen that a decrease of temperature of 25° C. (*i.e.* from 49° to 24°) has slowed down the loss of sulphite approximately 100 times, with a great resultant increase in the storage life of the dried vegetable.

It is evident that the storage temperature is the most important single factor of those that determine the rate at which sulphite is lost from dehydrated vegetables.

Effect of Moisture

Another important factor is the residual moisture in the dehydrated vegetable; the more moisture is left in, the faster the sulphite is lost, and the shorter the storage life. Gore and Mangels[6] estimated that the initial moisture contents at and below which colour and flavour were well retained for at least six months at normal temperatures were as follows:

	Per cent.
Carrots	5-7·4
Turnips	5
Onions	5·7-6·6
Spinach	3·8-5·4
Cabbage	3-3·3

If the moisture content was considerably higher, deterioration was marked; *e.g.* carrots of 11·1 per cent. moisture content faded distinctly during sixty-eight days' storage, and turnips of 11·5 per cent. moisture content showed browning and developed a peculiar odour in thirty-three days.

It should be noted, however, that in these cases the products were not canned, but were kept in the dark at 70° F. to 90° F. in tightly sealed glass fruit jars. The products were not sulphited; this series of experiments was designed simply to explore the effect of residual moisture.

Legault *et al.*[7] also found that the rate of sulphite disappearance increased as the moisture content of the dehydrated vegetable rose; the following figures illustrate this:

Vegetable.	*Moisture content on moisture-free basis.*	*Initial sulphite content.*	*Temp.*	*Rate of loss of sulphite.*
Carrot ..	8·0	2,190	49° C.	0·110
	5·4	1,740	49° C.	0·058
Potato ..	9·2	340	49° C.	0·110
	5·3	340	49° C.	0·029

They found that the rate of disappearance of sulphite approximately doubled with each moisture content increase of 1·5 per cent. to 2 per cent. Legault *et al.*[7] had previously observed a similar relation for the browning of unsulphited dehydrated vegetables, and they consider that this provides additional evidence of a common factor in the processes of browning and of sulphite disappearance.

Effect of Oxygen

The effect of oxygen was determined by comparing the behaviour of air-packed samples with nitrogen-packed samples. The rather surprising finding was made that although at low temperatures such as 24° C. (75° F.) the air-packed sample lost its sulphite twice as quickly as the nitrogen-packed sample, yet at the higher temperature of 49° C. (120° F.) air-packed and nitrogen-packed samples behaved nearly identically. As, however, dehydrated vegetables would normally be stored at reasonably low temperatures, it is clear that nitrogen-packing might be expected to increase, perhaps to double, the storage life.

Effect of Processing Conditions

Mangels and Gore[8] carried out an early investigation, again without the use of sulphite, to determine the maximum safe drying temperatures. Briefly, for the vegetables under review, they found these to be:

Cabbage.—Easily injured. Injury supervened in 16 to 20 hr. at 50° C., 12 to 14 hr. at 55° C., and in 1 hr. at 75° C. In moist heat injury occurred after 6 to 8 hr. at 50° C.

Carrots.—Not easily injured. In dry air, no injury occurred in 18 hr. at 60° C., while injury did occur in 10 to 12 hr. at 65° C. Moist air at 50° C. injured the carrots in from 17 to 18 hr.

Potatoes (sweet).—Resistant to injury. Temperature lower than 80° C. did not seem to injure sweet potatoes, at least not for many hours.

In all cases, as the drying temperature is increased, the exposure necessary to cause injury decreases. Moisture seemed to have a detrimental effect. In this connexion Iles and Sharman[9] of the Imperial Tobacco Co. have recently found that it is essential to have a good draught during the drying of tobacco (for moisture determination), as if drying is carried out in a moist atmosphere the "steaming" of the tobacco results in considerable darkening of its colour; in some cases a "bright" tobacco turned nearly black.

In the case of dehydrated carrots, no significant effect in the rate of loss of sulphite was caused by varying the blanching time from two to eight minutes.

No significant difference in loss of sulphite was apparent between batches that had been sulphited during or after blanching; nor was difference discernible between lots that had been treated with sulphite as spray or as gaseous sulphur dioxide.

If the carrots were soaked in water for one and a half hours after blanching and before dehydrating, the loss of sulphite on subsequent storage was reduced to about one-sixteenth of that for samples which were otherwise comparable but were not soaked. It is thought that this is due to excessive leaching losses of substances reactive towards sulphite under storage conditions. These substances are probably aldehydes and ketones which will contribute largely to the flavour of the vegetables.

Conclusions

1. Dehydrated fruits and vegetables that have been sulphited gradually lose sulphite on storage.

2. There is a close correlation between discoloration and loss of sulphite in dehydrated fruits and vegetables. The longer the sulphite is retained, the longer the storage life of the foodstuff.

3. The rate of loss of sulphite increases rapidly with increase of temperature. A rise of 10° C. (18° F.) in storage temperature will increase the rate of sulphite disappearance fourfold and may quarter the storage life.

4. The residual moisture in the dehydrated fruits and vegetables influences the rate of loss of sulphite and so the storage life. An increase of 1½ per cent. to 2 per cent. in moisture content (*i.e.* from say 7 per cent. to 8½ per cent.) may double the rate at which sulphite is lost and halve storage life.

5. At room temperatures nitrogen-packed dehydrated vegetables retain their sulphite twice as long as do air-packed materials. This advantage is lost at high temperatures, but for practical purposes nitrogen packing appears to be distinctly advantageous.

6. Changes in processing appear not to have a great effect on subsequent rate of disappearance of sulphite. Those conditions which would normally be used to give a good product, *e.g.* avoidance of high drying temperatures below 25 per cent. moisture, and good air-flows to avoid "steaming," are probably advantageous.

7. It seems likely that the sulphite normally combines with the aldehydes and ketones which are among the most important of the flavouring components of fruits and vegetables. So long, therefore, as sulphur dioxide is retained it may be expected that flavour will be retained, but as sulphur dioxide is lost, flavour will be lost; off-flavours and discoloration will supervene.

(*References at foot of next column.*)

Vegetable Production

A STATION for research in vegetable production in Great Britain has now been established under a governing body constituted as a company limited by guarantee and without a share capital, with the title "The British Society for the Promotion of Vegetable Research."

The members of the governing body include nominees of the two Agricultural Departments of Great Britain and the Department of Scientific and Industrial Research, of various learned societies, universities, and institutions concerned with horticulture, of vegetable producers large and small, and of trade interests. The chairman of the Society is Prof. F. T. Brooks, M.A., of Cambridge University, and the Director of the Research Station is Dr. James Philp.

The headquarters station at Wellesbourne, Warwickshire, consists of 280 acres of deep sandy loam over gravel or keuper clay; the land is being purchased by the Ministry of Agriculture and will be leased to the Society, but some time will elapse before buildings and equipment can be provided, staff engaged, and the farm generally developed for research purposes.

The Ministry is also leasing to the Society 150 acres of land which it owns at Paglesham, Essex, for a sub-station primarily to be used for the multiplication of stocks of seed of vegetables bred at the main station or elsewhere. A second substation is the former Horticultural Research Station at Cambridge, which has been taken over from the University; the staff will continue to work there until they can be transferred to the headquarters station. Cambridge University is continuing to make available the land and facilities hitherto used until the transfer can be effected.

The Society will work in close co-operation with existing research institutions engaged in research on production and processing, and also the experimental husbandry farms and horticultural stations of the National Agricultural Advisory Service.

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Prospects of the Israeli Citrus Industry

ERIC HARDY

Palestine's main citrus-growing areas are in the coastal plain of what is now Israel and, to a lesser extent, in the Jewish and Arab parts of the Jordan Valley down to Jericho. Very little of the industry now remains in Arab hands, at least sufficiently so to influence the export market. During the civil war vast numbers of Arab villages and orchards in the coastal or citrus-growing area were evacuated, and the refugees had to leave their orchards, which were taken over by the new State of Israel. Except for a few cases where the Arab refugees returned, these have been occupied by the new immigrants.

THE future of the citrus industry depends entirely upon the export market; the industry suffered much from its inability to make normal exports during the war. The shortage of labour during conscription, together with the neglect of orchards during the trouble and the very steep rise in costs today, has resulted in heavy losses for the citrus growers, for it was only the most forward plants which could produce fruit early enough to be on the English market for Christmas.

Citrus growers have accepted the Israeli Government loan to help them cultivate their groves this season, but urged that a start be made immediately upon a full citrus recovery plan to be devised jointly by the Government and the Farmers' Association. This twelve-year loan totals £1,600,000, and is part of the American loan to Israel.

With the loss of so many Arab growers and the substitution of unskilled Jewish immigrants newly arrived from Europe, the average productivity of the citrus worker has fallen to a low level of two to three boxes per day instead of seven to ten. Israel is at present undergoing severe austerity which, it is hoped, will bring down wages and general production costs, and enable the citrus fruit to be marketed in competition with rivals on the European market. Competition comes chiefly from the Californian, South African, and Italian citrus growers. The South African growers have a great advantage in the readiness of their products for the Christmas market. To a lesser extent there is competition from Spain, the Gold Coast, Canada, West Indies, and Japan.

The Weizmann Institute at Rehovoth, research centre of the Israeli citrus industry.

Only 3,021,000 cases of citrus fruit had been exported from Israel by March this year against contracts which last season alone totalled 5·5 million boxes. In the Mandate period before the war about 20,000 Jews were employed in the citrus industry; this year between four and five thousand workers were employed in the groves. In normal years as many as 80,000 boxes of oranges were picked per day in the season from November to February, whereas now the rate of picking is 30,000 boxes a day. With present high costs this is so expensive an item that most growers are avoiding picking the fruit on the tops of the trees, as the labour cost does not produce adequate returns. The complaint of the exporters last winter was that comparatively small quantities of fruit were reaching the ports at Haifa and Jaffa, and this was handicapping them more than the former labour shortage at Haifa port and the usual risk of bad weather which slows down exports.

It was becoming increasingly obvious by February this year—the beginning of the cultivation season after the picking—that many middle-class Jews engaged in the citrus industry were abandoning their groves and did not intend to cultivate them any longer. The new loans will furthermore increase their already heavy burden of debt.

It will take some time before technical improvements in the form of mechanisation can be intro-

duced, and the prospects for increased numbers of Jaffa oranges at lower prices on the British market at Christmas are not very bright. The Israeli Government is setting up a new single Citrus Board with wider authority to take the place of the Citrus Control Board and the Citrus Marketing Board.

Citrus By-products

The citrus by-products industry began the export of citrus concentrates this year, and by February it had supplied 160 tons (about half the ordered amount) to Czechoslovakia and about 150 tons (5 per cent. of its contracts) to Britain. Producers complained that they had received far less fruit than the agreed amount, and this shortage caused their factories considerable losses.

The Assis factory opened a new department last winter for the exploitation of citrus fruits. About £140,000 has been spent on plant for the grinding and drying of peel and for the extraction of alcohol from peel juices. During the current season about 2,500 tons of fodder are being extracted from citrus peel in order to obviate the necessity to import.

The juice extracted in the grinding and drying process contains about 11 per cent. sugar, and by fermentation the plant will produce 4 or 5 tons of alcohol (methylated spirits) daily; it is planned, however, to double that amount and produce pure alcohol.

The Weizmann Institute at Rehovoth, where iron rations containing citrus concentrates were devised for Israeli soldiers, continues to be a centre for research in the processing of citrus fruits. Among matters being studied are: production of essential oil from the peel, pectin from the pith, citric acid, ascorbic acid, and various products of carbohydrate fermentation, as well as the production of juices, squashes, and marmalades.

The Indian, as well as the English, markets are not being ignored by those interested in the production of citrus concentrates; but there is a shortage of suitable machinery and of containers such as tins, bottles, and barrels, and it will be many years before it is possible to compete with American citrus products.

Despite the slow progress in citrus recovery in Palestine and the present low production and high costs compared with Mandate times, the fact remains that ideal conditions for citrus growing exist in Israeli territory, and in a few years the industry could make good the losses inflicted by the civil war.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Practical Canning

THE contents of two new books on canning which have recently been published—one* in its third edition and one† which makes its *début*—demonstrate the fact that the science and art of the preservation of food by this method has not remained static.

Osman Jones's third edition of the book (of which he was co-author with T. M. Jones in the earlier editions) comes eight years after the previous one, during which time, despite the war years, considerable advances have been made. This new edition augments the description of the manufacture of tinplate, and reviews the latest evidence on the subject of corrosion.

In the analytical and bacteriological sections the newest methods of analysis, including chemical and biological assays for vitamins, are discussed, while revised methods for the sampling of cans for bacteriological examination, methods of examining the suspected matter in food poisoning cases, and new culture media are included.

The book is excellently illustrated and produced.

In his book, Mr. Howard, while following the sequence from can making to the finished article, treats the various angles of the subject from what he terms the practical point of view, although he does not neglect the consideration of basic scientific principles.

A chapter is devoted to the subject of corrosion phenomena, the importance of which is manifested by the inclusion of no less than 44 references to the literature. Some useful general considerations in establishing a cannery form the subject of another chapter, and heat sterilisation is also discussed at some length. As in previous chapters, the literature has been well searched and recorded, which will enable the enquirer to follow up in a more complete way the indications given.

* *Canning Practice and Control.* By Osman Jones. F.R.I.C. Third Ed. revised. Pp. 322+xvi. Chapman and Hall, London. Price 36s. net.

† *Canning Technology.* By A. J. Howard, M.A., A.R.I.C. Pp. 287+viii. J. and A. Churchill, London. Price 30s. net.

BOOKS RECEIVED

Orders for any of the books listed below or reviewed in this issue may be placed with the Books Department, FOOD MANUFACTURE, 17, Stratford Place, London W.1. It is regretted that under present conditions it is not always possible to supply books by return of post.

Wishful Cooking. By Emily Lina Mirrlees and Margaret Rosalys Coker. Pp. 228. Faber and Faber, London. Price 12s. 6d. net.

The Pitman Dictionary of the English Language. Pp. 733+xxi. Pitman, London. Price 15s. net.

The Identification and Properties of Vitamin B_{12}

One of the most dramatic of recent advances in nutrition is the isolation and identification of vitamin B_{12}. Its discovery was the result of a long search for the nutritional factor in liver which would be effective in the treatment of pernicious anaemia. This vitamin also is believed to play an essential role in the growth and development of the normal mammal, and appears particularly important in the utilisation of protein. Milk and milk products appear to be among the foods possessing vitamin B_{12} activity.

FOR centuries vague expressions of the concept that food bears a relationship to anaemia have appeared in medical literature. As the science of nutrition developed, it was learned that a deficiency of iron in the diet, or a loss of the power of the body to assimilate iron, causes simple anaemia of the hypochromic type. Hypochromic anaemias are characterised by a lowered concentration of haemoglobin since iron is a necessary constituent of this oxygen-carrying pigment in the red blood cells.[1] Copper was found to be necessary before the iron could be used by the body for haemoglobin synthesis. Deficiencies of cobalt and pyridoxine in the diet also appear to cause anaemia, and deficiencies of niacin, riboflavin, and ascorbic acid have been reported to produce anaemia in experimental animals.[2] In addition, adequate quantities of protein are necessary for haemoglobin synthesis. Thus it is now realised that a diet made up of a variety of nutritious foods which supply recommended amounts of all dietary essentials is helpful in the treatment and prevention of hypochromic anaemia.

Treatment of Anaemia

Iron and other known dietary factors were of little benefit in the treatment of some anaemias, however. These were the macrocytic anaemias, which include pernicious anaemia, the anaemia of sprue, and the macrocytic anaemia of pregnancy. In these anaemias there is not merely a smaller amount of circulating haemoglobin, but also a reduction in number and a change in the structure of the red blood cells, together with possible decreases in the number of white cells and platelets.[1] The first advance in the treatment of these anaemias was made many years ago when it was discovered that eating whole liver, in the amount of a pound or more daily, would cure pernicious anaemia. During the years that followed, chemists tried repeatedly to isolate from liver the factor responsible for its effect on pernicious anaemia. Eventually, extracts of liver were developed which could bring about the same remission as whole liver, and in April, 1948, a pure crystalline compound believed to be responsible for the anti-pernicious anaemia activity of whole liver was isolated by Rickes and associates from the liver extracts.[3] The new compound was named vitamin B_{12}.

A short time after the report of the crystallisation of vitamin B_{12} the isolation of an anti-pernicious anaemia factor in liver also was reported by Smith.[4] British studies help to confirm the presence and activity of vitamin B_{12}. They also indicate the minute quantities in which the new vitamin appears. From four tons of liver, about one gram of the highly active vitamin was obtained.

Vitamin B_{12} and Pernicious Anaemia

Soon after the isolation of crystalline vitamin B_{12}, its activity was tested in patients with various types of macrocytic anaemia. Both West[5] and Spies[6] have found it to be highly effective in producing blood regeneration. Striking improvement in the well-being of the patients was noted. Furthermore, vitamin B_{12}, like liver extracts, also was found to be highly effective against the neurological or nervous manifestations of pernicious anaemia.[7, 8] In addition, a limited number of cases of nutritional macrocytic anaemia and of non-tropical sprue have been successfully treated with vitamin B_{12}.[6, 8]

It has been found that folic acid, another B vitamin, and thymine, a purine compound, also promote blood regeneration in macrocytic anaemias.[8] Vitamin B_{12} may be related functionally to both folic acid and thymine.[9] Purines, such as thymine and pyrimidines, are essential substances in all cells. The animal body does not depend on preformed purines or pyrimidines in the diet, however, since they are synthesised by the body. It appears that vitamin B_{12} and folic acid may function at different stages in the enzyme system necessary for the biosynthesis of these basic constituents of blood cells.[10]

Properties of Vitamin B_{12}

Vitamin B_{12} is described as a red, heat-stable, cobalt complex, containing phosphorus and some nitrogen. An outstanding feature of vitamin B_{12} is its content of the trace element, cobalt,[11] the presence of which may explain why traces of cobalt have been suggested as essential in the treatment of anaemia.

Vitamin B_{12} was chosen by Rickes and associates as the name for the new anti-pernicious anaemia compound because B_{12} had not yet been used in the B-complex series and because it connotes nutritional significance only and does not extend indications of biological roles which have not been adequately studied.[3] Recent experiments which demonstrate that Factor X reported by Cary and associates[12, 13] is identical with vitamin B_{12},[14] indicate the wisdom of the name chosen for the new compound and also that the new vitamin may have a broad usefulness in normal nutrition, as well as in the treatment of pernicious anaemia.

The New Vitamin in Normal Nutrition

Early reports of work carried on for many years by Cary and associates indicated that rats on a diet adequate in all known nutrients required an unidentified factor for normal growth.[12,13] This Factor X was found to be stored in the young at weaning, but by feeding mother rats a diet deficient in Factor X, young animals depleted of the factor were obtained. Such depleted animals showed marked retardation of growth. On the average, their growth was only 54 per cent. of normal, *i.e.* of rats on approximately maximally effective doses of liver extract. However, when supplements of commercial liver extract were fed, growth returned to normal, indicating that liver was a potent source of Factor X. Recently, maximally effective doses of vitamin B_{12} and of liver extract were fed to rats as supplements to the Factor X-deficient ration. The rates of growth of the rats were normal in both cases, indicating that in so far as growth is concerned, Factor X is vitamin B_{12} or some B_{12}-active material.[14]

Cary and associates have found vitamin B_{12} to be essential for growth and development and probably for reproduction and lactation in experimental animals. The first evidence of a specific function of vitamin B_{12} in normal nutrition also comes from the work of these scientists. They believe that vitamin B_{12} plays an important role in the capacity of the normal mammal to utilise diets containing various levels of protein. The feeding of high levels of protein in B_{12}-deficient rations was found to be very deleterious. Growth when the B_{12}-deficient ration contained 25 per cent. protein was 54 per cent. of normal; with 45 per cent. protein growth was reduced to 25 per cent. or 30 per cent. of normal; with 65 per cent. of protein the animals either failed to grow or died. In each case, supplementation of the diet with vitamin B_{12}, or with liver extract, had equivalent beneficial effects. Very minute doses were effective in supplementing the deficient diets. This confirms the statements of other workers, that vitamin B_{12} is one of the most potent biologically active compounds known.[3, 8]

Effect of Lactose

An interesting aspect of the work by Cary and associates is the effect of the vitamin on the utilisation of diets containing lactose.[14] When 25 per cent. pure crystalline lactose was fed in B_{12}-deficient rations, it depressed growth. Liver extract overcame the growth depression. However, when dried skim milk, instead of the pure crystalline sugar, was fed as the source of the 25 per cent. lactose, growth was normal. This shows how the vitamin B_{12} activity of milk enables the animal to use effectively the lactose, as well as the protein, in milk.

Sources of Vitamin B_{12}

Vitamin B_{12} was first isolated from liver.[3] In addition, Rickes has isolated it from a mould of the *Streptomyces* species which may prove to be an important commercial source of the crystalline material.[15] Cary and associates, using biological experiments with rats, have obtained valuable information on the B_{12} activity of many foods.[14] Casein prepared by simple centrifugation was found to be a good source; commercial "vitamin free" caseins were variable sources depending upon the method of preparation; while casein subjected to repeated hot alcohol extraction was found to be almost devoid of Factor X or B_{12}.[13, 16] When dried skim milk was fed to rats in comparison with B_{12}-active casein prepared from it, both the casein and the skim milk were active. It appeared that the B_{12} activity of the casein accounted for a very large portion, if not all, of the B_{12} activity of the dried skim milk.

Supplementing B_{12} Deficiency

When varying amounts of fresh milk were fed as supplements to a B_{12}-deficient ration, the rate of growth increased with each increase in amount. This was true with cows on barn feeds as well as on pasture, and with cows that for years had been on feeds in which it was impossible to detect any vitamin B_{12} activity. Various cheeses also did an excellent job of supplementing the B_{12}-deficient ration. It was concluded that milk and milk products probably contain little or no B_{12} as it occurs in liver extracts or as it has been isolated, but they do possess vitamin B_{12} activity when fed to the normal mammal. On the other hand, experiments with cereal grains, oil meals, and yeasts indicated that these products are deficient in B_{12} activity.

Cary and associates found evidence that, under certain dietary conditions, bacteria which either synthesise B_{12} or some B_{12}-active material may thrive in the intestine of the rat. Exceedingly high levels of riboflavin, fed experimentally, were found to play a very important role in bringing about this synthesis. Perhaps the ability of the cow to produce milk high in B_{12} activity from feeds deficient in this vitamin is related to rumen synthesis of vitamin B_{12}.

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Frozen Citrus Purée

SUCCESSFUL research into the commercial possibilities of frozen citrus *purées* has been reported from the U.S. Department of Agriculture's Research Laboratories at Pasadena. Hitherto the opinion of manufacturers had been that citrus fruits were too strongly flavoured for processing in this way and that their storage life would be short, but after the processing of several experimental packs of orange and lemon *purée* made by the Laboratory of Fruit and Vegetable Chemistry in Los Angeles in the 1947 season and after storing for a year at 0° F., it was concluded that the frozen citrus *purée* did not develop unsatisfactory flavours if properly prepared.

The processing method consists of washing the fruit, preferably with a good detergent, and rinsing in cold water. The stem of the fruit is then cut off and other discoloured spots are removed so that no dark specks will be mixed in with the bright-coloured *purée*. After trimming, the whole fruit can be either crushed through a machine such as an apricot pitter, or quartered, and reduced to a *purée* by passage through a mechanically driven screening device. The yield of *purée* from the whole fruit is approximately 50 per cent. to 60 per cent., and it should contain 0·65 per cent. to 0·75 per cent. of peel oil. If the peel oil content of the *purée* is too high, it can be controlled if various proportions of the fresh fruit are passed through an abrasive machine to remove most of the oil sacs.

The product is then run into a stainless steel tank and dry sugar is gradually added with thorough mixing in the proportion of 5 parts of *purée* to 1 part of sugar. The sweetened *purée* is filled into containers, hermetically sealed, and the contents are frozen in an air-blast freezer at sub-zero temperatures of 0° to 10° F. High acid citrus *purées* should be packaged in lacquered or enamelled cans.

News from Our Contemporaries

THE factors involved in the problems of control of insects infesting stored products and the solution of those problems are discussed in an article published in the November issue of *World Crops*. In the same issue oats is the subject of an instalment in the series "World Cereals Today." "Recent Advances in Tea Research" is the second of a series also published in this issue.

First among the applications of ion exchange was water treatment, but exchangers are now being used for the removal of impurities from sugar, starch, and similar materials. The latest and most striking use of these ion exchange materials has been as catalysts. An article discussing this subject appears in the October issue of *International Chemical Engineering and Process Industries*.

Plant Instruments and their Maintenance

LEO WALTER, A.M.I.Mech.E., A.M.I. Plant E.

Modernisation of plant equipment in order to increase all-round efficiency involves the installation of numerous measuring and controlling instruments in addition to the usual pressure gauges, thermometers, or liquid level gauges. As a result of the growth of the use of indicators, recorders, and controllers, a broader view has taken place not only concerning the many advantages of instrumentation itself, but also in connexion with the need for servicing and maintaining instruments already installed.

NO hard and fast rules can be given on the choice of the right type of instrument because of the many factors which have to receive individual consideration. Specialised experience is often necessary to decide upon the method of measurement or the mode of control, and this decision should be left to instrument experts. Closest co-operation between plant engineer and control engineer is necessary where controllability of a manufacturing process is low, or where close measurement of process control is important. The plant engineer should supply fullest details of the working conditions of the plant to the makers of instruments, which will form the basis for an analysis of the process from the measuring or control angle. The works engineer should know the fundamentals of measuring and control theory to enable him fully to understand the working of instrument mechanisms, and to enable him to service and maintain them correctly.

Choosing Measuring Instruments

The reliability of an instrument supersedes all other requirements. Straightforward design, a minimum of delicate moving parts, sturdiness, and simplicity of function have to be taken into account when comparing measuring instruments serving the same purpose and having the same accuracy.

Where greater accuracy is achieved without increasing difficulties in maintenance, a more accurate instrument will have precedence, in spite of higher first cost.

The use of an indicating or recording instrument depends entirely on the merits of each case. The main point to be considered is that chart records require daily examination in order to check performance of processing, and to take irregularities into account. The best recorder is useless if charts are simply filed away without being regularly scrutinised. Instrument maintenance must also be ascertained for recorders, which usually require more attention than indicators.

A plant may be very well instrumented, but not always be fitted with large dials. Chart instruments are preferable which have a large dial and bold pointer and figures on the instrument scale.

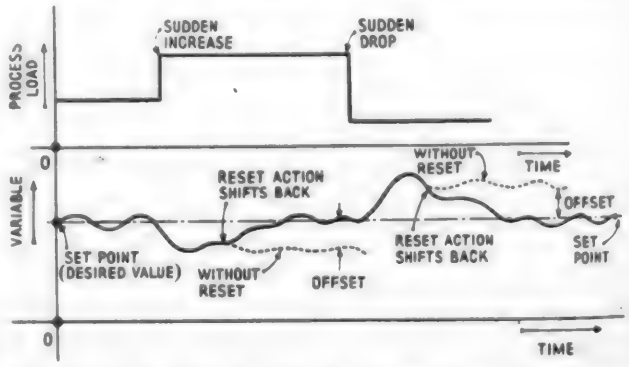
Plant operators should be trained how to read indications of measurement and how to arrive at the right conclusions.

It is essential that the owner, works manager, plant superintendent, works engineer, and foreman be familiar with instruments in the plant. This encourages operators to accept instrumentation and to co-operate.

Where over twenty-five elaborate instruments are installed in a works, employment of a skilled instrument mechanic to look after them is advisable.

Electrical or Non-electrical Instruments

Whether to fit electrical or non-electrical instruments depends on local circumstances. For example, a thermocouple instrument might be preferable for temperature measurement, where a mercury-in-steel thermometer with capillary would be out of the question owing to the distance between thermometer bulb and measuring mechan-



Automatic reset action of pneumatic controller which corrects offset in case of disturbances of heat load of process.

ism. Splash water, humidity, corrosive fumes in the air, danger of explosion, and other factors might reverse such a choice. A rate of flow meter, working as head instrument (differential pressure from orifice in pipe) might be preferable as electric resistance type in one instance, but as bellows or diaphragm type without mercury in another instance, *e.g.* in food factories.

References given by the makers for instruments working on the same or similar plants are valuable guides in making a decision on choice, but it should be ascertained that not only the plant, but also method of processing and working conditions in general are identical or similar. The same instrument might work well on a piece of plant equipment in one works, but badly on the same equipment in another works, where working conditions may be different.

Electrically operated instruments depend on a regular and constant supply of power. A well-equipped works will have a standby source in case of power cuts, thus enabling processing to proceed with electric measurement.

The preliminaries to fitting controls vary from filling in a data sheet provided by the manufacturers of controllers, to elaborate tests and calculations on the spot. In practice the interest of potential users of control instruments expresses itself in various forms, but the only way to obtain correct information about details of the control problem is for the control expert to go and find out for himself what he wants to know.

Re-use of Instruments

The re-use of a regulator, which has become redundant on one piece of plant equipment on another process, requires great care. It is obvious that working conditions might be so different between the two uses that another type of control mechanism is required for the new job. For example, a simple spring-loaded steam reducing valve might have worked quite well in one pipeline, but would fail when refitted into another steam mains, where load fluctuations are heavy and cause erratic control. Probably only a pneumatic pressure regulator could hold the low pressure steady in the second instance.

Another problem is the refitting of a thermostatic hot and cold water blender from a job which has been abandoned to another job where it failed. In one case investigations showed that temperature conditions in the second instance were impossible, because hot water temperature was 80° C., cold water temperature 22° C. to 23° C., and blend temperature was supposed to be only 25° C. in the second case, whereas it was 35° C. in the first instance. The blender could not work on a temperature differential between cold and blend of only 2° C., because the hot inlet port remained practically closed under these new unfavourable working conditions. The majority of controllers have been designed, calibrated, and adjusted for a particular job, and cannot just be shifted.

Accuracy of Control and Maintenance Cost

While the choice of control methods is mainly the job of the control expert, the user generally has to state at which accuracy he wishes to perform control. Caution has to be exercised by the potential user of control mechanisms before expressing his requirements. First, accuracy of control depends not on what the user of a control mechanism wishes to obtain, but on what the process will allow. In other words, the user must know the degree of controllability of his process and keep within these limits when stating his claims for accuracy.

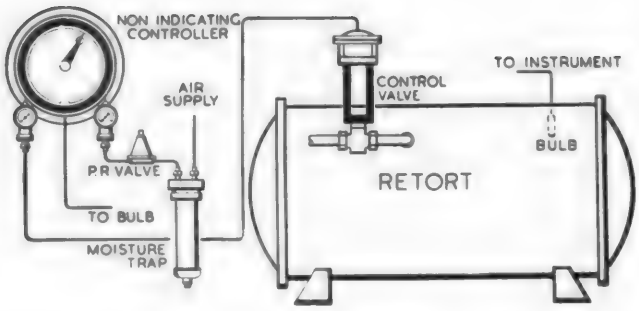
Secondly, accuracy of control is obviously closely related to financial considerations, because in general the greater the required accuracy, the more elaborate becomes the control mechanism, and first cost and maintenance expenditure rise accordingly.

If the user is willing to tolerate moderate accuracy, *i.e.* certain deviations of the controlled variable from the set point, the choice of simpler control instruments is possible, and they are easier to maintain. Generally speaking, where process load and the supply of the controlling medium are fairly steady, and where the duration of a process is rather prolonged, simple controller types can be used, provided that only moderate accuracy of control is required.

An instrument department can be made part of the operating department, or of the department for general maintenance. The former is to be preferred because production and instrumentation are closely interconnected. The operatives concerned with instruments must know how a new instrument works, and be familiar with methods of adapting it to process conditions by adjustment or re-adjustment, and with its maintenance in efficient working order. Knowledge of instruments can be gained by dissemination of information on instrument engineering by:

(*a*) Careful study of makers' literature before ordering a new instrument.
(*b*) Discussion of every measuring or controlling problem with an instrument expert.
(*c*) Study of fixing and maintenance instruction of each new instrument from start to finish, before the instrument is fitted.
(*d*) Studying periodicals, papers, and books which will give a fundamental knowledge of the theory and practice of measurement and control.
(*e*) Attendance at lectures, instruction courses, exhibitions, and industrial fairs.
(*f*) Visits to makers' works to acquire first-hand knowledge from the people who calculate, design, and make the instruments.

It might be advisable to send an assistant, foreman, or fitter for a week or a fortnight to an instrument maker to be trained in adjustments and



Simple air-operated non-indicating temperature regulator on food retort.
Diagram Negretti and Zambra.

maintenance of those instruments which are in use at a works. There are optimum settings of controllers which it should be known how to achieve. There is the choice of the most suitable location for pressure tapings, thermometers, thermostat bulbs, thermocouples, and orifices, upon which the makers' head fitter would advise. The ability of a trained instrument man to diagnose trouble quickly without a great deal of wasted time will make fruitful this training period in a specialised instrument workshop. Until a few years ago, few educational facilities have been available for familiarising engineers with instrumentation. Neither colleges nor universities in this country or abroad had a special chair for instruments, or specialised courses for students. The older generation of technicians had to aquire the necessary theoretical knowledge by study in their spare time, and from practical experience.

Training in Instrument Technology

Things have changed for the better since the war, and it is hoped that one day a National Certificate for Instrument Technology will be available for students who wish to take up the career of an instrument engineer. One of the first colleges to specialise is the Borough Polytechnic College of London, where lectures are being given by fully qualified teachers of instrumentation. Big firms have also established apprenticeships for instrument engineers for their own works under skilled guidance.

The Society of Instrument Technology arranges lectures at their various branches, and other institutions frequently have papers read on this subject. The Ministry of Fuel and Power's Sub-Committee on education in fuel efficiency also contributes much to the spreading of knowledge on instruments by lecture courses.

Blaming the Instrument

If trouble arises in a process, the instruments are often blamed by the plant operator. It may be, however, that faulty operation of the plant equipment was the first cause of unbalance of the process, and this has reflected itself in the behaviour of the instruments used.

Overstrain of instruments can easily be caused by faulty operation and must not be blamed on the design of the mechanism. If an instrument becomes faulty it should not be allowed to remain in this condition. Preventive maintenance will detect inefficiencies by performance of regular accuracy tests based on a time schedule, to be followed by an overhaul by the man trained for this purpose.

A daily careful inspection of recorder charts by the works engineer might reveal details of processing, which have escaped the attention of the plant operator, but might also disclose a faulty instrument. If careful inspection of the instrument discloses a strained condition of certain parts of the mechanism, often caused by overload, a well-trained staff will handle the case properly. Minor defects will be detected, and may be put right on the spot. Other causes of breakdown might mean a complete overhaul and re-calibration of the instrument at the makers' works.

Modernisation of Existing Plant

The introduction of new machines and apparatus, equipped with elaborate measuring and/or controlling instruments for their economical operation, should be an inducement for top executives to modernise existing plant. This can be achieved by improving working conditions, layout, alteration of design details, fitting of better auxiliary equipment, such as steam traps, air vents, strainers, etc., by exchanging out-of-date gauges for modern measuring or controlling indicators or recorders. The use of automatic control instruments is rapidly growing with the modernisation of plant equipment, and is beneficial to uniformity of goods and for manufacturing efficiency in general. The reluctance to measure has gradually disappeared, and rule-of-thumb methods have made way for a more scientific approach by proper measurement in processing of goods. From measurement to automatic control is only a small but very important step.

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Pork tongues are packed several small tongues to the can in jelly.

Danish Packed Meats

MARIUS JENSEN

Acting Chief, Meat Packing Laboratory, Royal Veterinary and Agricultural College, Copenhagen

From humble beginnings at the end of last century, Danish meat packing has developed into an industry of real importance to the country's economy. Before the war it had a considerable production of high-quality goods that were marketed in many countries.

THE reduction in the supplies of raw materials and packing which resulted from the war and from Denmark's separation from the free world, owing to the German occupation, caused a temporary suspension of the industry's development. Post-war shortages of raw materials and tinplate, together with the need of mass-produced special goods by war-shattered countries and controlled marketing, made a fresh start difficult, but the recent gratifying increase in the production of raw materials, consequent on the reconstitution of animal stocks, has facilitated further progress. Accordingly, the industry is now able to resume the full-scale production of goods of pre-war quality, particularly since the factories are technically well equipped with super-pressure autoclaves and other modern machinery.

The raw materials come chiefly from Danish pig production, which, by intensive breeding, has developed the special bacon type of pig which, when fed with skim milk from the Danish dairies, makes a suitable raw material for the various kinds of packed pork products. This rapidly fattened pig has a superior flesh structure, not too coarse, and with a suitable fat formation.

Cattle farming, which is principally organised for milk production, gives a surplus of good quality calves that are a well-adapted raw material for many products. On the other hand, the special production of beef for eating is small in extent.

Jellied veal, removed from the can, and sliced.

Before slaughter, the animals are examined by a veterinary surgeon appointed by the Ministry of Agriculture, and immediately after killing there is a further inspection. Should these inspections reveal signs of disease, rendering the animal unsuitable for human consumption, it is rejected and must be destroyed. By stamping the carcass with a special stamp the veterinary surgeon guarantees that the meat is fit for consumption.

When the meat arrives at the meat packing factory it is examined to see that it is properly stamped as coming from animals duly certified at the time of slaughtering, and that it has not suffered during transport to the factory. The carcasses are then cut up into suitable portions. Instead of whole carcasses, the factories sometimes receive pieces ready cut for the production of the various goods.

A variety of goods is produced, and since special consideration must be paid to the wishes of different customers, to give a detailed description of them is beyond the scope of this article. Some, however, are of special interest and take the form of standard articles.

One of the items which the Danish meat packing industry is able to produce in the finest quality, by reason of the excellent raw material available, is boneless cooked ham. It is sold in cans of a size to fit a whole ham, and with a gross weight of 10 to 14 lb. Smaller sizes are produced to meet customers' desires. The ham is boned during production and cured in brine of a suitable strength, which gives the meat an attractive red colour, a delicate aroma, and an agreeably mild salt flavour. Slight smoking before it is canned adds to the delicacy of the flavour. After cooking the canned ham is tender and juicy. It is done in a way which gives very little meat juice or gravy in the can, so that waste is reduced to a minimum. When removed from the can and sliced the ham is ready for eating.

Similar choice products, specially suited for sandwiches, are ox tongues and pork tongues (lunch tongues). Ox tongues are packed in conical cans made to hold one tongue. Pork tongues, on the other hand, are packed several small tongues to the

A packed ham, cut and sliced for inspection.

Pork brawn, made from the meat of pigs' heads, after removal from the can.

can in jelly. Cut into slices, this product has an attractive appearance, with the fine red tongues in clear jelly, and an appetising aroma and flavour evolved by appropriate curing in brine of a special compound.

From the meat of pigs' heads pork brawn is made. The meat is stripped off and is lightly cured, cooked, and cut into cubes of a convenient size, after which soup is added and it is packed. In the cooked product the pieces of meat are attractively distributed. It can be cut into thin slices and is then ready for use without any further cooking. Careful control during every phase of production ensures a commodity with the right jelly content and fine, homogeneous meat distribution without too much loose fat.

From veal a similar product, jellied veal, is made. Light curing gives the meat a pleasing pink appearance. The product, which is firm and takes the form of pieces of meat in a clear jelly, can be sliced.

Pork Products

Pork in natural juice is made from the meat of whole pigs with the exception of the fattest parts. On account of its high food value, its usefulness under varying conditions, and its fine taste, it is a highly esteemed product, and considerable interest is shown in it in many countries.

As a food, liver paste, made from liver, pork, and lard, and spiced and seasoned, is a very valuable product rich in vitamins. Its uniform consistency makes it a good sandwich spread.

Of various sausages mention may be made of Frankforters, made from pork and other meat in thin sheep casings; these are delicious, juicy, and tender with a delicately seasoned flavour. The sausages are canned in a stock in which they are heated before eating. A sausage of an altogether different character is pork sausage (ham sausage), a firm product with white cubes of fat on a pink surface made for slicing.

During the production of these and many other goods at factories licensed by the Ministry of Agriculture, a veterinary surgeon, appointed by the Ministry, supervises the hygienic side of the processing and sees that the regulations governing production are observed. All cans are stamped with a special trade mark consisting of a crown surmounting the name " Denmark " and containing the factory licence number. This trade mark is a guarantee that the product comes from a State-controlled factory, to which it can be traced back if required. The factories also carry out their own control of keeping quality by testing their products in thermostats.

A further control of the quality of the finished products is carried out, before they are exported, by the Meat Packing Laboratory of the Royal Veterinary and Agricultural College in Copenhagen. Control is maintained with the assent of all factories, and is based on the taking of random samples of all goods produced. The samples are subjected to a thermostat test for keeping quality, are judged for quality by expert judges, and examined for net weight and quality of packing. The judging committee includes representatives of the Bacon Board of the Ministry of Agriculture, the Laboratory, and the packing firms. The tests and judging form the basis on which export licences are issued.

Besides co-operating in controls, the Laboratory carries out experiments and research in the production of packed meat and assists the factories in an advisory capacity.

Courtesy Danish Foreign Office Journal, 2, 1949.

News from the Industry

FORTHCOMING EVENTS

S.C.I. Agriculture Group

The following meetings are included in the 1949-1950 syllabus of the Agriculture Group of the Society of Chemical Industry:

Dec. 9. "Whither Insecticides?" Dr. R. A. E. Galley (Agricultural Research Council). 5 p.m. in the Chemistry Department of the Royal College of Science.

1950.

Jan 17. "Some Agricultural Problems of the Colonial Empire." Sir Harold A. Tempany, C.M.G., C.B.E. (lately Agricultural Adviser to the Colonial Office). 2.30 p.m. in the Chemistry Department of the Royal College of Science.

Feb. 21. "The Use of Isotopes in Agricultural Research." Mr. A. J. Low and Mr. P. A. Collier (I.C.I.). 2.30 p.m. in the Chemistry Department of the Royal College of Science.

Mar. 21. "Agricultural Science as a Profession." Sir James A. Scott-Watson, C.B.E., (National Agricultural Advisory Service). 5.30 p.m. in the Chemistry Department of the Royal College of Science.

Apr. 18. Joint meeting with the British Society of Soil Science. "Chemical Aspects of Soil Fertility." From 10.30 a.m. to 5 p.m. Details to be announced later.

May 16. Annual general meeting, followed at approx. 3 p.m. by "The Organisation and Work of the Agricultural Research Council." Dr. W. K. Slater (Secretary of the Agricultural Research Council). 2.30 p.m. in the Chemistry Department of the Royal College of Science.

June 10. Summer meeting at Jealott's Hill Research Station, Bracknell, Berkshire.

Anglo-American Sales Conference

National Sales Executives (an American association) have accepted an invitation to hold a joint conference with the Incorporated Sales Managers' Association on techniques of distribution in London next February.

During the past ten years the emphasis in British distribution practices has been on costs and on selective selling. It is hoped that this exchange of views will reveal the requirements of dollar markets and explain American techniques for organising mass distribution to match large-scale, low-cost production.

The conference will be an open one, and all organisations which are actively interested in the sale of British goods in dollar markets will be invited to co-operate.

Tea Knapsack

Called the "Tea Knapsack," a new type of container for use where tea service trolleys cannot be used, has been produced by G. F. E. Bartlett and Son.

In order to give greater comfort to the operator, the experience of

climbers of Mount Everest has been studied, resulting in the harness being so constructed that the weight of the container is taken at the hips.

The unit has a capacity of 2 gallons (45-50 cups of tea), and weighs 38½ lb. when filled.

Food Technology in Glasgow

The creation of new food technology sections forms part of the programme of expansion to be carried out by the Royal Technical College, Glasgow. Although the College has always shown interest in subjects covering preparation of food, and particularly the bakery industry, this is the first time the various sections have been merged to provide a complete food technology department. Laboratory facilities have also been added for this department.

B.E.A. Elect Vice-President

Mr. David D. Walker, M.A., M.I.E.E., Joint Managing Director of Evershed and Vignoles, has been elected a Vice-President of the British Engineers' Association. He has been a member of the Council since October 1939 and has taken an active part in the affairs of the Association.

Organising Overseas Sales

It has often been said that British manufacturers do not pay sufficient attention to the special requirements of overseas markets. To avoid this charge being made against them, the A.P.V. Company have built up a complete overseas organisation capable of giving on-the-spot dairy engineering service.

In order to increase the effectiveness of this organisation, a conference attended by overseas agents and representatives was held during the week prior to the Dairy Show under the chairmanship of Dr. Richard Seligman. This week of debate served to correlate views and needs in a way that correspondence could never do, and the papers and discussions will arm the overseas organisation with invaluable information to help it to stimulate further progress abroad and thus to expand the sale of British plant.

Filling and Sealing Machine

With a speed of twenty to thirty bottles per minute, a machine has been designed for the feeding, filling, and sealing of vials or small bottles such as those used for penicillin and streptomycin. Appropriate filling heads are provided for powders or liquids, and different shapes of bottles can also be accommodated on this machine, which is produced by the Automatic Weighing and Packing Machine Co.

The containers are fed from a conveyor to an intermittently rotating table which takes them to a filling point. After filling the rubber stopper or metal closure is placed into position, the latter being automatically spun over to seal the bottle before discharge on to an outlet conveyor. Attachments for screw capping can also be supplied.

New Moisture Meter

The manufacturer's claim of an absolute accuracy of ±1 per cent. moisture content—equivalent to an error of prediction of about 0·4 per cent.—was upheld after tests had been carried out by the National Institute of Agricultural Engineering on the new Marconi moisture meter.

In design the moisture meter employs a d.c. resistance-bridge circuit with electronic null-detector which makes the reading independent of valve characteristics and supply voltages. In conjunction with its compression cell the instrument has advantages over the typical capacitance method of moisture determination in both reduction of packing and other errors.

Another advantage of the instrument is its ability to test a wide range of materials using only a single scale corrected for temperature variations. Measurement range is 8 per cent. to 25 per cent. and readings are reproducible to within 0·2 per cent.

Food Factory Expansions

Berkley Hygienic Food Products Co. are to build new factory premises at Ladysmith Road, Grimsby.

*

The factory premises of Glaxo Laboratories at Ulverston, Lancs., are being extended.

*

A site at Sweet Street, Leeds, has been acquired by J. Lyons and Co. for the erection of a new factory and warehouse. The company are also planning to carry out large-scale extensions to their premises at Oldfield Lane, Ealing.

*

Radiance, Ltd., confectionery manufacturers, propose to carry out extensions to their factory at Churchill Road, Doncaster.

*

A large new factory is to be built at Hornsey, London, by Smithfield Refrigeration Co.

*

A new canning factory is to be erected at Clive Street, Tynemouth, for Tyneside Butchers' By-Products.

Annecy Tariff Negotiations

A White Paper (Cmd. 7792) dealing with the Annecy Tariff Negotiations was recently published by H.M. Stationery Office. The full Tariff Schedules annexed to the Protocol which has been agreed at Annecy are not attached to that White Paper owing to their number and length, but copies are on sale at the Stationery Office and, for the convenience of business men, reference copies have been distributed to the principal Chambers of Commerce and regional offices of the Federation of British Industries; copies can also be seen at the National Union of Manufacturers, 6, Holborn Viaduct, London, E.C.1., and at the Commercial Relations and Exports Department, Board of Trade, Enquiry Room (0093), Thames House North, Millbank, S.W.1.

Liver Fluke in Great Britain

The menace of the parasitic worm known as the liver fluke, which causes disease and death among sheep, and condemnation of sheep and cattle livers in the slaughterhouses, is shown in a recent C.O.I. film.

The life cycle of the parasite, from the mammal host to a snail host, and from the snail host round again to the mammal, is explained. The long history of the discovery of the life cycle is outlined, and the developmental stages in the life of the parasite are shown.

Cure of the disease by the administration of drugs is not always successful, and in the acute form of the disease no effective medication is possible.

Present-day research at the Ministry of Agriculture Veterinary Laboratory has mainly been devoted to clearing up obscure points in the life of the snail host, since this is the most vulnerable point in the life cycle of the parasite. Such matters as the kind of habitat in which the snail lives, its survival under drought conditions, its rate of breeding, and the effect of temperature on the emergence of the parasites from the snail have been elucidated.

A suitable snail poison has been developed, and research workers are now carrying out field trials. Their object is to survey selected farms and identify the localised places where the snail host lives and breeds. It is thought that effective control of the snails may be secured by spreading poison in these places only.

If farmers learn to identify the snail habitats on their own land, and get rid of them by land draining or the localised use of snail poison, it may be possible to prevent the outbreak of severe epidemics of the disease.

Life cycle of the liver fluke, showing the snail host and the emergence of the swimming flukes.

Bakers' Annual Convention

DEMONSTRATIONS, COMPETITIONS, ENTERTAINMENT

Seven hundred bakers from all over the country attended the 4th Annual Sales Conference of Procea Products held at the Dorchester Hotel on October 18.

During the afternoon session demonstrations of retarded fermentation by refrigeration and the "sponge and no dough" method were carried out; these are designed to assist the baking trade in the event of the abolition of night baking. Two films entitled "Unseen Enemy" and "Better Bread" dealing with hygiene and bread making respectively were shown, and current advertising and sales aids were exhibited.

Loaves for the Procea 1948-1949 competition were judged by Dr. A. J. Amos, Mr. W. E. Spencer, and Mr. R. C. Bartlett. First place was achieved by M. Spencer and Co. of Ashbourne; second came A. Jones and Son of Finchley, who won first place last year, while the Harrogate firm of J. R. Graves came third.

A new development announced during the conference was the production of a roll in the form of a miniature loaf with the proprietary trade name embossed on each side; this is believed to be the first roll of this type in the history of British baking.

At the dinner in the evening Mr. L. D. Gammans, M.P., was the guest of honour. Other speeches were made by Mr. S. A. Lancaster, managing director of the company, Dr. D. W. Kent-Jones, Ph.D., B.Sc., F.R.I.C., and Alderman S. Stephens, J.P. During the evening the Procea cup was presented to the winner of the annual competition for the best baked Procea loaf by Miss Mavis Perry, the Bakery Industries Queen.

After the presentation of prizes, guests danced to the music of Sydney Lipton's orchestra and were entertained by Irene Palmer and Raymond Newell, and Spence and Davies.

New Scottish Canning Plant

Plans are being developed for the expansion of canning and food manufacturing at Dalkeith in the east of Scotland. A disused railway station is now being converted into a soup and food packing factory which will be run on model lines, special attention being paid to the creation of a super-hygienic unit. New plant now being installed includes boilers, canning equipment, and labelling machinery of the most modern design.

This development will provide a new market for a wide range of produce in the east of Scotland and will encourage such activities as chicken farming.

Miss Mavis Perry, the Bakery Industries Queen, presents the Procea Gold Cup to Mr. and Mrs. Maurice Spencer of Ashbourne.

Obituary

Arthur Vernon Tapp died on October 27 at the age of 54. Starting his professional career in the engineering department of the Post Office, at the outbreak of World War I he joined the Royal Engineers and became an officer attached to the General Staff.

Returning to civilian life, he entered the film industry and was one of the first engineers to specialise in sound production. In 1931 he joined Short and Mason as technical representative on the industrial side of this organisation. In this capacity he was instrumental in applying auto-control equipment to a number of complex problems with outstanding success.

In 1939 he had an accident resulting in partial paralysis of the legs, but continued in active employment until Easter 1947.

Throughout an active business life his cheerful personality and helpfulness gained him a host of friends, and during his long and painful illness his courage and optimism were an example to those who saw him.

Mr. Tapp leaves a widow and two sons.

*

Mr. W. N. Hallett, a managing director of Cadbury Bros., died in Birmingham on October 13.

Born on April 10, 1890, Mr. Hallett was educated in Birmingham, subsequently becoming a member of the Institution of Mechanical Engineers. After gaining engineering experience, he went to Cadbury's in 1910, and in 1929 became chief engineer. He was also appointed chief engineer to J. S. Fry and Sons, Somerdale, and was later made a director of Fry's. He was appointed managing director to Cadbury Bros. in 1943. Enlisting in the Motor Transport Corps in World War I, he was transferred to the Ministry of Munitions, and helped to establish vegetable drying factories.

Bread Wrapping

The necessity for a motor is eliminated in the bread wrapping and sealing machine manufactured by British Waxed Wrappings. The sealing unit is heated electrically, but models heated by gas can also be supplied.

New "Help Yourself" Store

A new grocery and provision store, designed on the "Help Yourself" lines, was recently opened by Pearks Dairies at Kenton, Middlesex.

For the general lighting, fluorescent fittings specially designed by Benjamin Electric have been installed. The fittings are of the totally enclosed ceiling type, with white metalwork, each housing two 40 W. fluorescent tubes with control gear. The fitting is made in three parts—chassis complete with frame for mounting to ceiling, removable, quickly detachable gear plate, and hinged front, which is arranged for easy detachability and to gain access to the fluorescent tubes. The sides are sloped so as to avoid any collection of dust, and the front panel is glazed with a special diffusing glass of high efficiency.

Inside Pearks Dairies new "help yourself" provision and grocery store at Kenton, Middlesex.

Food Manufacturers Meet

The North Western Food Manufacturers' Association, which is allied to the Sausage Manufacturers' Association, held its second annual dinner at Blundellsands Hotel, Crosby, on September 28. The Lord Mayor of Liverpool (Coun. George Moore of the Richmond Sausage Co.), who presided, said that the meat section was the most important of the food manufacturing trades represented and that it utilised approximately one-third of the meat imported into the country. Liverpool was one of the main centres of the trade, a fact which was not generally realised. Recognition by the authorities of what had been accomplished by the meat manufacturing trades in giving good service to the public was in a large measure due to the excellent service rendered by the Food Manufacturers' Federation. On many occasions the North Western Association, which was formed ten years ago, had helped not only the Federation, but many of the smaller associations. It had been largely instrumental in furthering the progress of the Federation in Lancashire.

The meat and other food trades had had a very difficult time in the last eight or nine years, and he regretted to say the outlook was still clouded. However, all looked forward to the time when there would be a return to free and healthy competition.

Mr. T. A. H. Sycamore, C.B.E., director and general secretary of the Federation, said he first came into contact with the North Western Association in the days when it was not torn so much between "the devil and the T.U.C."

Mr. Moore was chairman of the Sausage Manufacturers' Association and a member of the Council of the Federation. This organisation had grown enormously in size and importance, and its members constituted an important factor in the food manufacturing affairs of the nations. The Federation and the 72 food industries which he represented would always stand by the North Western Association and the other associations in the protection of their interests.

Meringue-producing Material

Designed for the replacement of egg albumen for specific bakery and confectionery uses, "Hyfoama" produces abundant dense foam, and can be adapted as a whipping agent in most cases. Always ready for use, it is a modified natural protein and thus adds to the nutrient value of foods.

A booklet entitled *Recipes and Hints for the Use of Hyfoama* by Walter T. Banfield, F.Inst. B.B., can be obtained from the manufacturers, Lenderink and Co.

"C" Licence-holders' Conference

The "C" Operators' International Study Group met recently for a two-day conference at Brown's Hotel, London. The Traders' Road Transport Association, the national organisation of C licence-holders, acted as hosts. Delegates from France, Switzerland, Belgium, and Holland were present to review the position of C licence-holders in the participating countries and to discuss common problems. The British viewpoint was presented by Col. A. Jerrett, M.Inst.T., President of the T.R.T.A., and Mr. F. D. Fitz-Gerald, National Secretary.

Midlands Packaging Conference

The second of their 1949-1950 series of packaging conferences, which was held by Boxfoldia at the Queens Hotel, Birmingham, on October 12, was attended by carton users from the Midlands and from Gloucestershire, Somerset, and Lincoln.

Mr. J. R. Foyle, joint managing director, spoke on "Cartons—Fitness for Purpose"; at the afternoon session Mr. Peter Ray, honorary secretary, Society of Industrial Artists, took as his subject "Colour in Packaging."

The collection of overseas cartons, which were shown at the London conference held some months ago, were exhibited.

Industrial Adhesive Tapes

Cellulose tape has recently been added to the range of cloth and paper industrial adhesive tapes marketed under the name of "Permacel" by Johnson and Johnson (Great Britain). These tapes are used in a variety of industries for masking, protection of highly polished surfaces, and in the packaging fields, particularly where air-tight seals are required for tins containing hygroscopic products.

In the case of cellulose tape, the adhesive compound is firmly bonded to the cellulose by a special process, and when the tape is removed from the surface to which it has been applied, no deposit of adhesive is left, so that the package is not made sticky and unpleasant to handle.

Purchasing Officers' Association

At the annual conference of the Purchasing Officers' Association, recently held at Scarborough, Mr. W. H. Napper (South-Eastern Gas Board), the retiring National Chairman, reported that the year 1948-1949 had seen another significant advance in the development of both the Association's membership and its national influence. The Association now had 24 branches and groups in the United Kingdom, and its membership exceeded 2,000 practising industrial and governmental purchasing officers.

Particular reference was made to the growth of the Education Scheme conforming with the national arrangements for management training sponsored by the Ministry of Education and the British Institute of Management, through which students and junior members were provided with the opportunity of equipping themselves for greater responsibilities in the purchasing field.

It was also reported that new head office premises would shortly be occupied at Wardrobe Chambers, 145a, Queen Victoria Street, London, E.C.4., from which the Association's appointments register would be conducted.

At the conclusion of the conference, Mr. T. F. Turner and Mr. D. Wragg were elected President and chairman respectively for 1949-1950.

Bacon Curers' Equipment

Bacon curers will be interested in the novel equipment for trimming and undercutting rib bones of pigs, including aitch bones prior to curing, which has been designed for continuous duty by the Flextol Engineering Company. The equipment reduces to a minimum the laborious hand method of cutting, and enables increased output and lower labour costs.

Similar equipment is designed for black scraping by means of a rotary knife which penetrates creases in the carcass and eliminates the fatigue which results from scraping by hand. A rotary bristle brush with water feed is produced for head cleaning and allied operations, while a chine bone removing handpiece is being developed.

The company's power-driven hand tools for cleaning food mixing containers find many applications in the food and allied industries, and the range of their attachments in this field is constantly being increased.

Contractors' Equipment

Particular interest was shown in the zinc and copper roofing exhibited by G. A. Harvey and Co. at the Building Trades Exhibition held at Olympia from November 17 to December 1.

Grilles, ventilating panels, radiator covers, covers for steam or hot water piping, and electric heaters are a few of the uses for which the company have supplied their ornamental metalwork, available in a wide variety of patterns.

An important feature of the mild steel gutters and fittings is that the process of hot dip galvanising after the goods are manufactured ensures complete coating of all surfaces, thus excluding rust-producing influences. Other galvanised products include tanks, cisterns, and cylinders.

Glazed partitioning, which can be dismantled and re-erected whenever desired, was used for the office on the company's stand; other Harco equipment for both offices and factory comprises steel desks and tables, filing cabinets, shelving and clothes lockers, storage bins, and racks.

Notable in the range of lifting and handling equipment exhibited by George Cohen Sons and Co., was the Hoistmaster electric hoist with lifting capacities ranging from 5 cwt. to 5 tons. The hoist is supplied with electric power drive, hand chain travel, or fixed suspension; all models below 2 tons capacity can also be supplied for push travel.

The high-lift power truck shown was representative of the Douglas truck range, which includes high and low-load elevating and non-elevating models, towing tractors, etc.

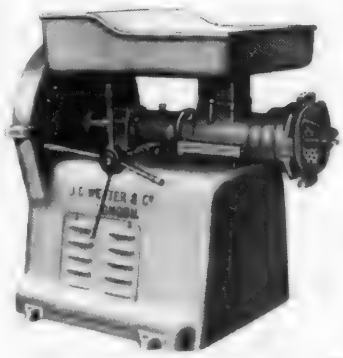
Mobile cranes on view included the Jones KL 44 and KL 15 with lifting capacities of 4 tons and 15 cwt. respectively; a new concrete mixer, various contractors' tools and equipment, and a range of Metalclad woodworking machinery were also shown on the stands of this group of companies.

Research Extensions at Aberdeen

The Torry Research Station, Aberdeen, is to be expanded immediately to house increased experimental work. Construction may not be started for some years in view of the present economy policy; temporary buildings are being erected and the first of these will be occupied shortly.

It has also been decided to replace the existing trawler with a new vessel, probably a general purpose research unit.

The Station is now working on an important new development in the mass freezing of fish at low cost—a process which interested organisations hope may radically alter the quick freeze position.



Machines for Meat Packers

Designed for large scale production, high capacity electric meat mincers or grinders manufactured by the machinery section of J. C. Wetter and Co. may be used for mincing not only fresh and frozen meat, but also fat, cheese, fish, and vegetables. One model is fitted with mincer plates 12 in. in diameter and powered by a 40 h.p. motor to ensure an output of up to 6 tons of minced material per hour. Mincer knives of unique design are fitted to obtain high cutting efficiency with minimum power consumption. Smaller models are also made, while special machines are designed for the whaling industry, gelatine works, manufacturing chemists, cheese processing factories, and others.

Further types of equipment produced by this firm include electric bowl cutters and hydraulic filling machines for the manufacture of sausages, and meat and fish pastes.

Another section of the company produces stainless steel food processing and handling plant such as steam jacketed pans, steam cookers, and food trucks, designed to meet particular requirements.

Change of Address

The divisional office of Shell Chemicals has removed to: 42, Deansgate, Manchester, 3. Telephone: Deansgate 6451.

The headquarters of the Northern Division has now moved to these offices, to deal with orders for chemicals derived from petroleum and the industrial solvents now being produced at the new chemical plant at Stanlow, Cheshire.

Anglo-American Project

An agreement to manufacture each other's products was recently signed between one of the leading British manufacturers of mechanical handling equipment and the Lake Shore Engineering Company, Michigan.

As a result, the Collis Truck, MotaVeyor, and RolaVeyor will soon be manufactured in America also and sold throughout the U.S.A. and Canada.

The makers of this equipment, J. Collis and Sons, will in turn manufacture in the U.K. in addition to their own products, American designed conveyors, automatic conveyors, and locomotive coalers, which will thus be made available for increasing productivity in British industry.

Industrial Designers Meet

Over 100 industrial designers from towns in the Midlands met in the Grand Hotel, Birmingham, recently under the chairmanship of Sir Percy Mills, K.B.E.; to hear Mr. Gordon Russell, Director of the Council of Industrial Design, give a talk on "The Industrial Designer's Responsibility."

Mr. Russell dealt with the many aspects of designing for industry, and emphasised the vital importance of design to the nation's success in overseas markets.

The Midland Industrial Designers' Association was formed as a result of Design Week Birmingham; its members meet regularly to exchange ideas and discuss problems with production and sales executives.

Dairy Show Exhibits

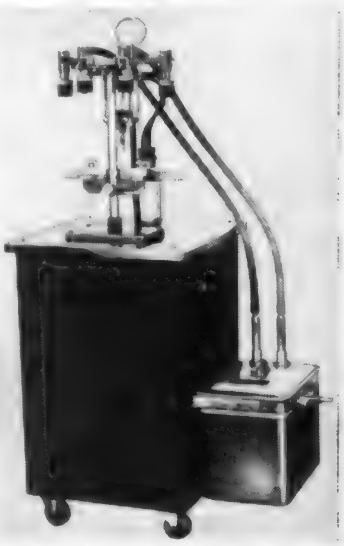
A new ice cream hardening and quick freezing tunnel, introduced by S. B. Engineering Co., hardens a continuous flow of ice cream at the rate of 60 g.p.h. Ice cream is fed automatically into the tunnel from the freezer at the desired rate and delivered at the same rate to the cutting and wrapping machine. The equipment is easily adapted for the quick freezing of food.

A complete range of their methyl and Freon condensing units, as well as representative models of their ammonia compressors, were shown by G. and J. Weir at the recent Dairy Show. One of the ammonia compressors was an entirely new design which had not previously been exhibited; other new equipment shown for the first time consisted of an economiser condenser and high-pressure and low-pressure float units. Models of the company's homogeniser were also included in the exhibits.

Vacuum Fillers

A new filler for handling chutney, sandwich spread, sweet pickles, mincemeat, and similar products which operates without introducing air pockets is being marketed by Nealis Harrison. The principle of filling is identical with that of the "Harrison-Rapid" twin head vacuum filler. This machine fills any shape or size of bottle from quart to the smallest sprinkler and achieves an output up to 1,500 bottles per hour according to size of bottle and nature of fluid.

The company also produce four head and single head vacuum fillers; stainless steel tanks can be supplied and fitted to any cabinet model, or mounted upon a stand for use with bench models, where supply is gravity fed from bulk. Other products of the company include rotary vacuum pump units, slat conveyor chains, and portable conveyor packing tables.



Twin head vacuum filler fitted with stainless steel tank and float valve.

Appointments

As a result of a re-organisation of the company, C. Skerman and Sons have appointed Mr. Harold Skerman to the position of general sales manager.

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At the last meeting of the board of directors of The British Thomson-Houston Co., Mr. K. R. Hopkirk, M.A., chief mechanical engineer, was elected a director of the company.

Factory Ship Lands Cargo

The quick freeze factory ship "Fairfree," owned by Chr. Salvesen and Co., of Leith, has landed her first quick frozen cargo at Princes Dock, Glasgow.

The "Fairfree" was recently converted from steam to Diesel propulsion, and made her maiden post-conversion trip to the Grand Banks, off Newfoundland. Working experience gained during the trip will be of considerable value in the subsequent construction or conversion of further units for this purpose.

Packaging Research for 1948-49

Packaging research work, including improvements in the strength of containers, measurement of the shelf life of packages, design of a device to measure the water-vapour permeability of materials of low permeability under low temperature (as in quick freeze storage), determination of means to prevent mould growth and insect attack on packages, is progressing well, it is stated in the annual report of the Printing, Packaging, and Allied Trades Research Association for 1948-1949.

As part of the research into the strength of containers, the Association are making a device which will be included in packages sent on road or rail journeys and will record the number of "drops" a package suffers in transit. Operational research methods are being used in part of the work aimed at improving the strength of containers by finding out the relationship between the design of the container, the strength of its component parts, and the strength and shock protection it provides.

OBITER DICTA

● A good way of selling all the snoek would be to start a rumour that it's going to be rationed.—*Star Man's Diary.*

● I saw food wasted in New York on a few days' visit that would feed the entire British nation for a week.—*Mr. F. V. Cross, a Cambridge baker.*

● At last the Germans have been punished. They are going to drink Mr. Strachey's Algerian wine. — *Peterborough in the "Daily Telegraph."*

● If Britain cannot pay what the meat is worth, let the British eat lentils and fish like other Europeans who also once boasted Empires—though theirs were more civilised than the British.—*"La Epoca," Argentina.*

● If Mr. Attlee and Sir Stafford Cripps would eat a solid well-cooked meal perhaps they would find themselves better able to discuss affairs of State. Good business and good diplomacy depend on good food.—*M. Jean Conil of the Imperial College of Science.*

● We want to make cooks into chefs and chefs into artists—as in France. We have got together to teach the chefs to cook and the public to eat.—*M. Jean Bouthemy, chef at the Reform Club, at a meeting of the National Academy of Chefs de Cuisine.*

● The only way to make a new food acceptable is to relate it to the old one. When whale meat followed snoek, I thought that politically I would be finished. Whale meat is now neither fish nor fowl, but it is hiding its Jack Tar accent and insisting on its roast beef connexions.—*Dr. Edith Summerskill.*

● We in this country should have shame on ourselves, the way we eat. A housewife without a chop in the fridge or a can of beans thinks her family is starving. I tell her to go to the fields and the hedges. Salad is growing wild—sorrel, dandelion, and all kinds of edible mushrooms that people think are toadstools. — *M. Thomas Guye, salad chief at the Imperial College of Science.*

Food Developments in Ayrshire

The establishment at various centres in Scotland of a number of depots where the collection and processing of vegetables, fruit, and meat will be carried on is planned by the Newforge group of companies.

Packing or canning of the products is to be undertaken in a large central plant, employing 500 workers, and the firm proposes to acquire Eglinton Castle for this purpose. Part of the castle would be stripped and the materials used to rebuild other premises in the area.

Negotiations are proceeding between the firm and the Ayrshire Town and Country Planning Committee; the latter has agreed to send a deputation to Northern Ireland to visit Newforge plants there.

Company News

A successful year's trading was reviewed by Mr. J. E. Lalor, chairman, when he presided at the ninth annual general meeting of Batchelor and Co. (Ireland).

An export market for canned vegetables had been developed, and he hoped for a considerable expansion in the company's export activities. Home trade had also increased, and they had recently introduced to the market a cream of tomato soup which had been well received. During the year their plant had been operating continuously, and their stocks, coupled with the present programme, ensured uninterrupted operation during the coming year.

The report of the directors and the accounts of the company for the year ended June 30, 1949, were adopted, and the payment of the preference dividend for the year to that date was also approved. A dividend of 10 per cent. and bonus of 5 per cent. (both less income tax) for the year to June 30, 1949, were declared on the ordinary stock.

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At a recent board meeting of L. Rose and Co., an interim dividend was declared on the ordinary shares of the company for the year ending December 31, 1949, at the rate of 5 per cent. actual, less income tax.

Booklets Received

The commercial background of oils and fats is discussed by Sir Herbert Davis in one of the articles in the autumn 1949 issue of *Progress*, the house magazine of Lever Brothers and Unilever. A tribute to the late Viscount Leverhulme and a reproduction of a lecture on the organisation of the group are followed by articles dealing with rehabilitation on the lower Rhine, synthetic detergents, a Nigerian forest factory, and Hartog's meat and edible fat factory in Holland.

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Presented in the form of a booklet entitled *The Third Link*, a brief survey of their industry has been made by the Electrical Contractors' Association and its allied organisation NECTA on behalf of their members. The title is derived from the fact that, with generation and distribution, installation is the third link in the process of bringing electricity to industry.

A leaflet showing typical examples of recent installations has been issued by Alfred and Company, consulting engineers to the ice cream trade and suppliers of every type of equipment for this industry.

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Articles on safety on the road and in the fitting shop, tyres for agricultural machines, inner tubes, conveyor belting, and transport operation, as well as company news are included in the autumn issue of *The Goodyear News*.

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Lifting, hydraulic (vertical type), screw bottle, and trolley-mounted hydraulic garage jacks are some examples of their stocks illustrated and described in a brochure of handling gear produced by Thos. W. Ward. Single, double, and treble purchase hand winches, triple-geared and travelling chain blocks, electric lifting and travelling chain hoists, and a gravity roller conveyor are also included.

Portable belt conveyors of the fixed boom type, and portable air compressors, pneumatic tools, and pumps, are the subjects of two leaflets issued by the company.

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Although aluminium conduits have been extensively used abroad for several years, suitable tubing has only recently become available in Great Britain at a competitive price. To introduce their conduit tubing, the Northern Aluminium Company have produced a brochure describing its characteristics in installation and *Magazine*.

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A four-colour cover distinguishes the autumn number of *Wall's Magazine*.

The issue contains 32 pages of company news and articles; featured are photographs taken during the summer ice cream boom, at the Roehampton theatrical garden party, and at a Works Wonders broadcast from the company's Willesden factory.

World Food News

Chocolate-flavoured Penicillin

A new penicillin product called Ledercillin Spersoids has been produced in the form of a chocolate-flavoured dry powder by the Lederle Laboratories of the American Cyanamid Co.

It is said to be the first stable flavoured penicillin powder for oral administration to be marketed in the U.S.; a rounded teaspoonful of the powder is estimated to be equal to 50,000 units of penicillin.

Irish Fermentation Industries

"Our present policy is to offer the Irish farmers enough security and inducement to ensure the marketing of as much malting barley as the industries require," said Mr. C. K. Mill, director of A. Guinness, Son and Company, opening a discussion on Irish fermentation industries by members of the Society of Chemical Industry in Dublin on October 12.

An Irish economy, soundly based on an agricultural industry with reasonable wages and an assured market, should, he said, provide a sufficient level of demand to give a basis for the continued prosperity of the industries.

The demand for beer had risen in the Republic of Ireland to the highest level in history, and while high wages and employment continued in Britain there would be a large demand for Irish ales and stouts which pleased the palate of the British public. Ireland had not been found suitable for the growing of hops.

He deplored the fact that because of short supplies of the wood needed for casks, the old craft of cooperage was endangered. Most brewers had been forced to experiment with metal casks, either of steel or aluminium, and these had proved most satisfactory.

Mr. W. F. Kirkpatrick, F.R.I.C., of Beamish and Crawford, Cork, said that coopers in Cork were justly jealous of their centuries-old family traditions.

Mr. L. V. Bishop, chief distiller, John Jameson and Son, Dublin, said it was unfortunate that the tendency was to concentrate the distilling industry in Dublin and the larger centres. The whisky distilling industry, as comparison with current Scottish production showed, was capable of great expansion.

Dr. G. Van der Lee, managing director, Ceimici Teoranta, Dublin, said that the production of industrial alcohol provided an outlet for agricultural surpluses.

Honey Packing Station

Consideration is being given to the establishment of a central honey packing and clearing station in Co. Wexford, Ireland, and a special committee has been appointed for the purpose by the Co. Wexford Beekeepers' Association.

At a recent meeting in Enniscorthy, Senator E. Richards Orpen said that the issue of import licences had curtailed the market for run honey, but there was no embargo on honey going into England.

Mrs. M. W. Davis, secretary of the Association, stated that a central canning and packing station was essential, and the working capital required could be raised if bee-keepers took a £1 share against every hive in the apiaries.

Import Control and Foodstuffs

EFFECT ON SOUTH AFRICAN FOOD SUPPLIES

As a result of severe import control measures which are being enforced the inflow of processed foodstuffs into South Africa has virtually ceased. In spite of being essentially an agricultural country South Africa has always imported a large volume of foodstuffs annually, and it is therefore interesting to study the effect of this sudden change in the supply position.

It should be emphasised that not only do preserved goods not enter the country any longer but also many other foodstuffs such as coconut and sago.

The state of affairs which exists now is due to practically no exchange having been provided for consumer goods for the six months ending December, 1949. One of the few exceptions made in respect of foodstuffs covers tea and coffee for which special import allocations have been made.

South African food manufacturers are in a good position to supply most of the lines which can no longer be imported—in fact they were in a position to meet the demand previously, but in certain cases there has always been a strong prejudice in favour of the imported article. This applied particularly in the case of canned fish.

It is interesting to note that the range of processed foodstuffs manufactured in South Africa has increased considerably during the past few years. There has also been a considerable increase in the number of manufacturers.

Local production has not yet felt the full impact of the import restrictions as both wholesalers and retailers have had considerable stocks on hand and it will be some time before disposal of these is effected. In addition there has been a marked decline in general consumer purchasing power during the past few months. This has affected sales of foodstuffs in common with many other commodities.

Study on Salted Cod

A commodity study covering landings, production, imports, exports, craft, and fishing grounds, entitled "Salted Cod and Related Species" has been issued by FAO.

In the inter-war period 1920-1939 the world's production of salted cod and related species averaged 259,000 metric tons, dried weight, annually. Four of the producing countries, France, Iceland, Newfoundland, and Norway, accounted for the bulk of salted fish production; the Latin countries in Europe and the Americas are the main consumers. Approximately 90 per cent. of total production entered international trade.

Much of the information contained in the study is to be found in the many tables of statistics, and, as similar data for the period under consideration (1920-1948) have never been compiled and collated on an international basis, they are set out in detailed form.

The outbreak of World War II in 1939 disrupted the salted fish industry. World production of salted cod and related species declined rapidly, and in 1943 and 1944 it totalled only about one-third of the average for the immediate pre-war years. The main reason for the decline was the diversion to fresh and frozen products. However, by 1947 salted fish production was back to the 1938 volume. Total production for that year was 253,000 tons, somewhat more than the high 1938 production. The 1948 figure is some 40,000 tons less than in 1947.

During the 1920's and 1930's, fish prices fluctuated greatly. In spite of quadrupled prices, post-war demand for salted fish has been high. Temporary gluts, however, emphasise the instability of markets.

Many salted fish exporting countries are expanding their fishing capacity, and landings are likely to increase further. If the present expanded markets for fresh and frozen products contract, some of the raw material now being utilised in these forms will be processed as salted and dried fish, and so add further to the substantial quantities which are already being produced.

Included in the 196-page book are chapters on Volume of World Trade; Operational Features of Salted Fish Industry; Institutional Factors — Influence of Government Action on Salted Fish Trade, 1920-1939; Prices Obtained and their Economic Consequences; and Salted Fish Industry Since the Outbreak of World War II, together with appendixes.

Synthetic Bacon in the U.S.

Patent rights for a bacon substitute, consisting of an emulsified mixture of finely ground pork skin and milk which is made into a paste with ground meat, pieces of fresh pork, and curing ingredients and then compressed and smoked, have been assigned.

The cheese porters in their varied coloured hats attract attention in the ancient Dutch cheese market at Alkmaar.

Hot Drinks and Sweetmeats

Bourn-vita, manufactured by Fry-Cadbury (Ireland), is to be introduced into the Republic of Ireland. The product will be made and packeted in Dublin, but it is not expected to reach the Dublin market until it has been exploited fully in Cork.

Caramello Block, a new product of the company, is also being introduced into the country. This product is packed in eight-section blocks, each section containing caramel centre.

Digestible Chewing Gum Base

Glycerine has a well established place as a softener or plasticising agent in the manufacture of chewing gum. One of the most recent uses for this product is described by W. P. Cohoe in U.S. Patent 2,469,861. His base, which provides a permanent-chew chewing gum, is unusual in that its ingredients are nutritious and that it is digestible if swallowed. An example of such a base, as given in the patent, is as follows:

	Parts.
Wheat gluten	80
Zein	20
Dicalcium phosphate	20
Soya lecithin (preferably oil-free)	10
Glycerine, 10 per cent. aqueous solution	70

Norway Plans to Can Afloat

During the whaling season that starts in the Antarctic in December, Norway will be operating a full-scale automatic canning plant capable of producing over a million cans of meat, liver paste, and special products. The canning plant, described as mechanically more modern than any at present operating in Norway, is being fitted on board Norway's largest vessel, "Kosmos V."

It will supply the company's factory ships and catcher boats with fuel, and take off the whale oil produced by the factory ships. In addition it will collect daily six tons of fresh whale meat for its canning plant. With this it is planned to produce 500,000 cans of meat cakes, 150,000 cans of liver paste, and also a number of experimental products during the course of some 50 or 60 days.

Cutting, weighing, and wrapping are eliminated by a new method of prepacking cheese.

Prepacked Cheese

A new method of prepacking cheese, devised by the Armour Company, eliminates the need for cutting, weighing, and wrapping in the store and also any losses due to shrinkage and extra handling.

The utilisation of this method ensures uniformity of flavour and enables the cheese to be stored for two months in its pack without any deterioration.

Crown Corks in Short Supply

Mineral water manufacturers in South Africa are facing a problem in connexion with the shortage of crown corks.

The two manufacturers of crown corks in South Africa are almost entirely dependent on overseas supplies for their raw materials. The import control authorities have not been very sympathetic towards providing exchange for crown corks as they regard the manufacture of mineral water as a luxury industry. Mineral water manufacturers contend, however, that their industry and those which supply the bottles and labels, provide employment for a considerable number of workers. While certain allocations have been made for the importation of raw materials, the future still remains obscure.

Obituary

The death recently took place in Limerick of Mr. Frank Cleeve, elder son of the late Sir Thomas Cleeve, one of the founders of the Lansdowne Condensed Milk Factory. Mr. Cleeve was managing director of this concern when it was purchased 20 years ago by the Dairy Disposals Board.

Fruit Juice Standards

The South African Bureau of Standards has prepared specifications for fruit juices in accordance with the following:

S.A.B.S. No.	*Specification.*
57-1949.	Orange squash
66-1949	Lemon squash
67-1949	Grapefruit squash
68-1949	Grenadilla squash
69-1949	Lime juice cordial
70-1949	Lemon barley water
71-1949	Grapefruit barley water

Specifications for orange barley water, canned orange juice, canned grapefruit juice, and canned grapefruit and orange juice are also in the course of preparation.

While general standards for fruit juices have existed hitherto under the Food and Drugs Act, the Bureau of Standards has laid down not only far higher standards of quality but also details concerning various aspects of the manufacturing processes.

Entrance to the first hall at Parma's Fair, in which was exhibited a display of packed foods.

Italy's Food Fair

Divided almost entirely between packed and processed products, plant, and packaging, the IVth International Preserved Food Exhibition held at Parma from September 8 to 19 was housed in special exhibition buildings of four large halls.

The tomato and tomato *purée* dominated the Fair, with cheese of all varieties receiving considerable prominence. Parma hams cured in the traditional manner, meat products, and *pâtés* of every sort were exhibited.

In the machinery section equipment for cubing and shredding gummy and sticky substances was exhibited and a machine of this type for cubing candied peel was demonstrated. Other equipment included the Bliss can-making plant with a capacity of 12,500 cans per hour, and a machine for making 5-gallon jelly cans.

Packaging displays included some ingenious collapsible cases and an attractive line of containers for jams, jellies, and other conserves which can be re-used for domestic purposes.

During the course of the Fair a visit was paid to the Experimental Institute and Station Laboratories for the food preserving industry of Parma. This Institute is the only one of its kind in Italy and it rendered important service during the war. It welcomes the collaboration of industrialists and technicians interested in the improvement of the quality of foods.

It is divided into two important sections: the scientific and the industrial laboratories, which can undertake research and examination of all foods. The scientific laboratory is divided into sections dealing with chemistry, biology, bacteriology, and canning, and a library. The industrial laboratory conducts research on fruits and vegetables, fruit juices, refrigeration, and more especially on the tomato and its products. Special attention is also paid to canning problems including corrosion.

Plant for Treatment of Coconuts

A request for offers for the supply of a complete, self-contained plant for the industrialisation of coconut has been received by Mr. W. V. Donald, British Consular Agent, Aracaju, State of Sergipe. The plant required is for the treatment of approximately 10,000 nuts per 8-hour day, covering the whole cycle of operations from the breaking of the nut down to the pressing for oil and extraction of sub-products, including milk and meal. A subsidiary offer for a margarine plant based on the basic treatment plant would also be of interest. The necessary boiler and steam power installations should be included in the offer; the fuel specified consists of coconut shells and residue. Manual labour in the operation of the plant should be reduced to an economical minimum.

United Kingdom manufacturers interested in this enquiry are invited to submit offers to Mr. Donald, who will arrange for the information to be placed before his enquirer.

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The United Kingdom Trade Commissioner at Colombo has advised the Board of Trade of a communication received from the Director, Coconut Research Scheme, concerning equipment that will be required, if present plans are approved, for an experimental laboratory where middle-scale research on coconut products will be carried out. The equipment is for processing these products in various ways to discover new uses and improve existing methods of treatment.

The Director would be glad to receive catalogues and price lists from manufacturers of small-scale processing machinery. United Kingdom firms interested in supplying this equipment are invited to forward their literature to the Director, Coconut Research Scheme (Ceylon), Bandirippuwa Estate, Lunuwila, advising the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1. of the action taken.

Equipment required is as follows:

Vertical boiler, syrup boiler, autoclave, pressure cookers, digester, flash pasteuriser, lifting and transporting truck, shredding, grating, and grinding machines, electric peeling machines, screw press, Hobart mechanical mincer, rasping machine, chip cutter, grinding mill, Peerless stirrer and mincer, Horlick emulsifier, ball mill, jaw crusher and motor, pulverisers, grinding rolls, edge running mill, kneading machine, chaff cutter, sifting and screening machine, rotary mixer, filter press, tunnel drier, tray drier, vacuum distillation equipment, fractionating column and still, Sharples centrifuge, tablet-making machines, self-recording scales, tensile testing machines (for fibres), factory thermometers and hydrometers, air compressor and motor, Lovibond tintometer, 16 mm. Cine camera and projector, and epidiascope.

News from the Ministries

Macaroni and Similar Products

The Macaroni and Similar Products Order, 1949, which replaces the Macaroni and Similar Products (Control and Maximum Prices) Order, 1947, as from October 23, 1949, has been made.

The new Order has the effect of:

(*a*) freeing macaroni and similar products from price control;

(*b*) relieving wholesalers and retailers of the responsibility of keeping records of their transactions in macaroni and similar products; and

(*c*) freeing the prepacking of macaroni and similar products from licensing control.

The provisions of the 1947 Order relating to the licensing of manufacture are retained in the new Order.

Prices and Market for Carrots

An Order is being prepared to prescribe maximum prices and marketing arrangements for carrots of the 1949 maincrop, between November 1, 1949, and April 30, 1950.

This will be the last season in which the sale of carrots will be controlled and, for this transitional period, it is proposed to replace the fixed growers' prices which were in force in previous seasons by a system of maximum prices. The Minister of Food will implement the guarantee given to growers by buying all standard grade carrots offered to him between November 1, 1949, and February 28, 1950, at the prices set out below. These prices, which are the same as the fixed growers' prices prescribed last season for standard grade carrots sold in District 1 (East Anglia and Yorkshire), will apply to carrots offered by growers in all parts of the United Kingdom:

Date of Delivery.	*Price per ton to be paid by the Minister.*
1949.	
November	135s.
December	140s.
1950.	
January	155s.
February	165s.
March	175s.
April	190s.

The maximum prices in Great Britain for sales by growers through the normal trading channels will be £1 per ton higher than the above prices and will apply to standard grade, washed, and bunched carrots. In Northern Ireland maximum growers' prices will be 10s. per ton higher than those prescribed last year.

The number of wholesale price districts in Great Britain will be reduced from eight to three.

There will be no restrictions on the size of bunches when carrots are sold bunched and no licence will be needed to trade in carrots. The prohibition of sales on commission which has applied in previous years will be repeated. Growers and wholesalers will be required to keep records of their transactions in carrots.

Bakery Products for Christmas

In order to help in the provision of cakes and other bakery products for Christmas and the New Year, the following increases in the allocations of sugar, fats, and eggs have been made for a single eight-week period:

Flour Confectionery

Ingredient.	*Amount of Increase. Percentage of Quantity Used during Datum Year.*
Sugar	7½
Fats	5
Egg products ..	10

Biscuit Manufacture (Class A Licence Holders)

Fat	One-tenth of the usual quantity

Egg Prices

Following the February review of agricultural prices, it was decided that the prices paid to producers for eggs should be subject to seasonal variation so as to provide an average price to producers during the financial year 1949-1950 of 4s. 1d. per dozen. The arrangement started with a price of 3s. 9d. per dozen on March 31, 1949.

In accordance with this arrangement the current price of 5s. 0d. per dozen for eggs sold by producers to licensed packing stations and licensed buyers will be varied as follows (all dates inclusive) subject to the existing deductions for second quality and dirty eggs:

	Per Dozen.
From October 20, 1949, to January 18, 1950 ..	5s. 6d.
From January 19, 1950, to February 15, 1950 ..	5s. 0d.
On and after February 16, 1950	3s. 9d.

The necessary amendments have been made to the Eggs (Great Britain) Order, 1949.

The Eggs (Northern Ireland) Order, 1949, has also been amended so as to give effect to the above prices. In addition, this Order

(*a*) fixes varying rates of deduction to be made from the fixed price where the licensed packer or collector takes delivery of eggs unfit for human consumption;

(*b*) fixes the following increased maximum prices on a sale of eggs by a wholesaler to an establishment:

	Per 120 Eggs.
Category I	37s. 1d.
Category II	32s. 1d.
Category III	27s. 1d.
Category IV	22s. 1d.

Export of Linseed Oil

A limited quantity of linseed oil can now be allowed for export.

Applications for export licences should be made to the Export Licensing Branch of the Board of Trade, Regis House, 43-46, King William Street, London, E.C.4, from whom application forms and further information may be obtained.

Castor and Rape Oils

The following changes have been made in the arrangements for the supply of crude and processed castor and rape oils:

1. Buyers of crude castor and rape oils should apply direct to the Hull or London branches of the National Association of United Kingdom Oil and Oilseeds Brokers for supplies. The Association will then issue contracts on behalf of the Ministry at the official prices ruling at the time the contract is made.

2. The Ministry has discontinued the issue of supply orders for processed castor and rape oils, and buyers of these oils should apply direct to processors for supplies.

Recent Changes in Exchange Rates

EFFECT ON IMPORT LICENSING

As a result of recent changes in certain rates of exchange, some import licences, expressed in terms of a sterling value, will not be sufficient to cover the full quantity of goods to which they were originally intended to relate.

Arrangements have now been made to enable importers to meet their foreign currency commitments in respect of commercial contracts *entered into on a foreign currency basis* for the import of goods under valid import licences issued before October 5, 1949. The effect of these arrangements is that authorised banks may approve applications for foreign currency to the full amount of currency contracts, so long as they are satisfied that the foreign currency applied for does not exceed the outstanding value of the relative import licence, converted at the rate of exchange ruling on September 17, 1949.

It has also been arranged that H.M. Customs and Excise will charge against import licences issued before October 5, 1949, the sterling equivalent of currency invoices, calculated at the rate of exchange ruling on September 17, 1949. For duty purposes the current rate of exchange will apply. Where consignments have been cleared by Customs since September 17, 1949, and the sterling value calculated at the new rate has been set against the import licence, the importer should approach H.M. Customs and Excise for an adjustment of the figures.

It is emphasised that these special arrangements relate only to cases where the sterling cost of imports is increased because contracts have been placed in terms of foreign currency. The banks will not allow excess payments in the case of sterling contracts (even if there is an exchange variation clause), nor will H.M. Customs and Excise make any adjustments in the case of goods invoiced in sterling.

Any import problems arising out of variations in the rate of exchange, which are not covered by the foregoing arrangements, should be addressed to the Import Licensing Department at Romney House, Tufton Street, London, S.W.1, except in the case of machinery imports, when queries should be addressed to the Department at 91, Victoria Street, London, S.W.1.

Christmas Cakes

As in previous years, an Order permitting the sale of iced and decorated Christmas cakes of a prescribed quality and weight at a price not exceeding 3s. 9d. per pound has been made. The Order will operate until December 31, 1949.

Coffee Prices

The Coffee (Maximum Retail Prices) Order, 1946, has been further amended as from October 30, 1949, so as to prescribe maximum retail prices for roasted coffee and coffee mixture sold in airtight containers lined with film, other than cellulose-based film. This new type of container is used extensively in the United States, Canada, and other countries, and its introduction into this country should result in a considerable saving of tinplate.

Feedingstuffs Prices

The Feedingstuffs (Prices) Order, 1949, has been further amended with effect from November 1, 1949, so as to make the following changes:

1. The rates of charge permitted for non-returnable sacks on sales of specified feedingstuffs are reduced as follows:

Old Rates (per cwt. of contents).	*New Rates (per cwt. of contents).*
16d.	14½d.
19d.	16½d.
21d.	19d.
24d.	22d.

These alterations follow the recent reductions in the maximum prices of secondhand sacks.

2. Corresponding reductions are made in the basic prices of specified feedingstuffs sold by gross weight.

3. Basic prices are prescribed for further varieties of feedingstuffs not previously specified in the Order.

4. The table showing the prices of feedingstuffs when sold in lots of less than 1 cwt. corresponding to a range of prices for hundredweight lots has been extended to include higher per cwt. prices. This extension results from the increase in the maximum prices of feedingstuffs which came into force on April 1, 1949.

Fancy Cheeses

The Cheese (Control and Maximum Prices) Order, 1948, has been further amended with the following effects:

1. From November 6, price control will be removed from the following varieties of cheese, which, as already announced, may from that date be imported by private traders from the countries specified under licences issued by the Board of Trade:

France—Camembert, Pont l'Eveque, Carré de l'Est, Brie, and Demi-sel.

Denmark—Camembert.

2. Parmesan cheese may now be imported from Italy by private traders under licences issued by the Board of Trade. For the present, import licences will be issued only to pre-war importers of Italian Parmesan cheese. This will be the first time Parmesan cheese has been imported from Italy since the war. It will be sold free of price control and off the ration. The necessary amendments have been made to the Fats, Cheese, and Tea (Rationing) Order, 1949.

3. The present differential maximum prices for varying standards of soft and curd cheeses produced in this country and in the Irish Republic will be abolished on November 6, 1949. From that date, one maximum retail price of 1s. 1d. per lb. will apply to these cheeses.

Fruit Curd and Mincemeat

The Food Standards (Preserves) Order, 1944, has been further amended so as to give statutory effect to standards of composition for fruit curd and mincemeat which have up to now been imposed administratively in manufacturing licences issued under the Preserves Order, 1947. The amending Order prescribes:

1. The minimum quantities of specified ingredients of fruit curd and mincemeat.

2. The minimum soluble solids content of these ingredients.

Information and Advice

Mixed Spice

B.3793. *Can you provide a recipe for mixed spice?* (Lancs.)

Mixed spice, in addition to spices, usually contains a proportion of rice flour and sometimes sugar. The spices employed are cinnamon, cassia, caraway, ginger, coriander, cloves, mace, and nutmeg in varying proportions, with cinnamon predominating.

The following are two typical mixtures:

	(1) *Per cent.*	(2) *Per cent.*
Rice flour	25	—
Cinnamon	28	32
Caraway	25	—
Coriander	3	32
Ground ginger	3	16
Mace	11	—
Nutmeg	5	16
Pepper	—	4
	100	100

Peanut Butter

B.3868. *We should be obliged if you could give us any information on the manufacture of peanut butter.* (Herts.)

There are four operations involved in the preparation of peanut butter, for which a blend of Spanish and Virginian peanuts is usually employed. These are roasting and cooling, blanching, cleaning, and grinding.

The peanuts are roasted according to the desired colour, at an approximate temperature of 320° F. The nuts are then cooled immediately by passing air through them.

Blanching is done mechanically which removes the germ and the red skin. The nuts are then screened.

It is necessary to subject the nuts to careful picking and cleaning in order to remove both foreign matter and defective nuts.

The grinding process is devised to provide a product of suitable texture which must be fine and granular. About 1 per cent. of syrup is sometimes added during grinding; this improves the flavour and is said to make the product more stable.

Information Supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.3749. *Corn flakes.* (Yorks.)

B.3751. *Potato peeling machinery.* (Yorks.)

B.3752. *Blood albumen.* (Devon.)

B.3753. *Grater or hammer mills.* (London.)

B.3759. *Pulverisers.* (Ireland.)

B.3760. *Pallet boards and trucks.* (Lancs.)

B.3761. *Mincing machinery for meat.* (Bucks.)

B.3762. *Lard antioxidant.* (London.)

B.3767. *Lecithin.* (Yorks.)

B.3768. *Sugar grinding machinery.* (Ireland.)

B.3775. *Rubber replacements for machinery.* (Ireland.)

B.3776. *Cardboard covers for jam jars.* (Staffs.)

B.3782. *Machine for jellying pies.* (Devon.)

B.3784. *Plant for the manufacture of milk powder.* (Sweden.)

B.3787. *Dutch apple syrup glucose mixture.* (Surrey.)

B.3788. *Popcorn machinery.* (Lancs.)

B.3790. *Potato crisp machinery.* (Lancs.)

B.3791. *Ice cream cone machinery.* (Canada.)

B.3794. *Ice cream equipment.* (Ireland.)

B.3796. *Cans for canning.* (Lincs.)

B.3797. *Cold storage equipment.* (London.)

B.3798. *Puffed wheat equipment.* (Herts.)

B.3800. *Protective food wrapping.* (Wilts.)

B.3802. *New lard antioxidant.* (Lancs.)

B.3815. *Tartaric acid.* (Devon.)

B.3816. *Canning equipment.* (London.)

B.3820. *Tween* 80. (Devon.)

B.3821. *Polyoxyethylene stearate.* (Ireland.)

B.3822. *Distillation and drying plant.* (Malaya.)

B.3823. *Plant for potato crisp manufacture.* (Sudan.)

B.3824. *Electric floor scrubber.* (Somerset.)

B.3826. *Homogenisers.* (Suffolk.)

B.3829. *Regulations regarding table jellies.* (London.)

B.3830. *Filling machines.* (London.)

B.3836. *Potato chipping machines.* (Lancs.)

B.3837. *Food mixing machines.* (Notts.)

B.3838. *Pails for factory use.* (London.)

B.3839. *Icemaking machinery and plant.* (Africa.)

B.3842. *Machines for peeling onions.* (London.)

B.3845. *Tea-seed oil.* (Lancs.)

B.3849. *Dehydrated apple.* (Cornwall.)

B.3850. *Cherry de-stoning machinery.* (Australia.)

B.3854. *Food colours.* (Pakistan.)

B.3855. *Fish meal processing plant.* (London.)

B.3856. *Wooden vats and mixed feed.* (Belgium.)

B.3857. *Small scale bottling and labelling machinery.* (London.)

B.3858. *Equipment for the preservation of fruit and vegetables.* (Kent.)

B.3859. *Automatic dispensers for essences.* (South Africa.)

B.3865. *Crates suitable for the transportation of jam jars.* (Middlesex.)

B.3869. *Containers for food which it is required to serve warm at least four hours after making.* (Ceylon.)

B.3873. *Cube compressors.* (Notts.)

Recent Patents

629,901. FARRAR BOILERWORKS, LTD., and PALMER, J. E.: Apparatus for sterilising and drying fish, fish offals, meat, vegetables, and the like.
629,925. PHIPPEN, A. J.: Devices for cutting cheese, butter, or the like.
629,962. SIMON, LTD., H., LOCKWOOD, J. F., and BALL, J. S.: Roller mills for cereal grain.

Abstract of a Recent Specification

Butter Wrapping

The invention is concerned more particularly with the actual wrapping and safety apparatus in which the wrapping chamber, which receives the block of butter or other material under the action of the piston and keeps it enclosed during the whole of the operation, is mounted on a carriage which has a horizontal reciprocating movement, the block to be wrapped meeting a sheet of paper brought by an automatic distributor as soon as it is introduced into the chamber, and the wrapping of the block being effected by the displacement of the carriage carrying the chamber which smooths down the two ends of the paper over the upper surface of the block.

The folding mechanism comprises two pairs of articulated jaws supported by a bracket having an up and down movement. This mechanism smooths down and folds in six folds the edges of the paper on the lateral faces of the block in three successive movements, after which the wrapped block is ejected from the chamber by a plunger and taken away by a conveyor.

An automatic stop and safety mechanism is also envisaged and is coupled to the control levers for the clutch of the machine to stop it automatically if the wrapping paper is missing or if a torn or crumpled sheet is presented to the wrapping chamber.
617,264. *Etablissements Simon Frères.*

Recent patents have been selected from the "Official Journal of Patents" and are published by permission of the Controller of H.M.S.O.

Trade Marks

VALLEY FARM.—658,004. Coffee, tea, flour, cereal preparations for food for human use, baking powder, salt, mustard, pepper, vinegar, sauces, spices, and treacle. **British Canners, Ltd.**, Widemarsh Street, Hereford; Manufacturers.
DEXTROPUR.—661,289. Sugar. **Corn Products Refining Company** (a Corporation organised under the laws of the State of New Jersey, United States of America), 17, Battery Place, City and State of New York, United States of America; Manufacturers.
BUTTABELLE. — 661,494. Butter flavourings (other than essential oils) for food. **W. J. Bush and Company, Limited,** 28, Ash Grove, Hackney, London, E. 8; Chemical Manufacturers.
HARMONY.—669,377. Canned vegetables, canned fruit, canned tomatoes, canned fish, canned meats, canned jam, and canned lemon curd. **William Hodkinson and Sons, Limited,** 74, Stuart Street, Bradford, Manchester, 11, Lancashire; Wholesale Grocers and Provision Merchants.
PARAMOUNT. — 671,972. Sauces. **John Hudson (Leeds), Limited,** Crown Preserve Works, Cowper Road, Leeds, 9; Manufacturers.
VITAGEN.—672,645. Bread. **Ernest Ostler, Limited,** Newington, Hull; Manufacturers.

Trade marks have been selected from the "Official Trade Marks Journal" and are published by permission of the Controller of H.M.S.O.

New Companies

St. George's Food Products, Limited. (467676.) 98, Nunhead Grove, Nunhead, S.E. To carry on business of manufactured processed foods carried on at 91, Nightingale Lane, S.W.12, by St. George's Caterers. Nom. cap.: £5,000 in £1 shares. Dirs.: W. V. Wootton, Lavender Cottage, Reigate Road, Ewell, Surrey (ch.); G. Hawkins, 16, Boutflower Road, S.W.11; C. H. Wignall and G. A. Hawkins.
W. D. Evans (Swansea), Limited. (467681.) To carry on business of oil and fat merchants and factors, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: to be appointed by subs. Subs.: E. C. Evans and Mrs. R. Evans, Wingate, Rotherslade Road, Longland, Swansea.
Chef Caterers (Yorks), Limited. (467687.) Holmsley Lane, Woodlesford, Leeds. Nom. cap.: £100 in £1 shares. Dirs.: E. Appleyard, Holmesley Lane, Woodlesford, Leeds; R. M. Ackroyd, Norbreck Hotel, Bridlington.
H. E. Alder, Limited. (468249.) 204, High Street, Chatham, Kent. To carry on business of bakers, confectioners, etc. Nom. cap.: £1,200 in £1 shares. Permt. dirs.: H. E. Alder, 17, South Avenue, Gillingham, Kent; E. G. Vokes, 26, Maidstone Road, Rochester; A. H. H. Hill, 104, Valley View Road, Rochester.
Supa Enterprises, Limited. (468294.) 1/6, North Lane, Faversham. To carry on business of sellers and manufacturers of potato crisps, bread, biscuits, and other farinaceous goods and products, etc. Nom. cap.: £4,000 in £1 shares. Permt. dirs.: A. C. P. Vince, St. Mildreds, The Parade, Birchington, Kent; J. H. Marchant, Buenos Aires, Joy Lane, Whitstable.
Jessex Products Limited. (468330.) 1113, Kerley Road, Bournemouth. To carry on business of manufacturers of and dealers in dehydrated fruit and vegetable juices, essences, etc. Nom. cap.: £100 in £1 shares. Dirs.: J. L. Jackson and G. C. Spong, 11/13, Kerley Road, Bournemouth.
Percy E. Binns and Son, Limited. (468371.) The Laurels, High Street, Wath-on-Dearne. To carry on business of biscuit manufacturers, bakers, confectioners, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: P. E. Binns and Phyllis Binns, Mayfair Private Hotel, The Esplanade, Scarborough; D. G. Binns, The Laurels, High Street, Wath-on-Dearne.
S. and G. Crisps, Limited. (468378.) 48, Windsor Crescent, Bridlington. To carry on business of manufacturers of and dealers in potato crisps, etc. Nom. cap.: £300 in 2s. shares. Dirs.: not named. Subs.: J. C. Beauvais, 81, Cardigan Road, Bridlington (acct.); E. N. Foster, Flat 8, 74, Promenade, Bridlington (acct.).
Varifoods, Limited. (468390.) 79, High Street, Winchester. To carry on business of dealers in foodstuffs of all kinds, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: H. J. Polder, 64, North Walls, Winchester; R. H. Legg-Bagg, 14, Western Road, Winchester; P. E. Taylor, 66, North Walls, Winchester.
F. R. Hicks and Son, Limited. (468486.) 117, Queensway, Petts Wood, Kent. To carry on business of biscuit manufacturers, bakers, confectioners, and pastrycooks, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: F. R. Hicks and Mrs. E. F. M. Hicks, 117, Queensway, Petts Wood, Kent.
Hadley's Crisps, Limited. (468494.) Central Chambers, Bearwood Road, Smethwick, 41. To carry on business of manufacturers of and dealers in potato crisps, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: Mary Hadley, 22, High Street, Blackheath, Birmingham; A. E. Dallow, 14, Springfield Road, Blackheath, Birmingham.
Willharts, Limited. (468518.) Buckton's Chambers, 57, Meadow Road, Leeds. To take over business of importers, exporters, merchants, and agents for and dealers in foodstuffs of all kinds carried on as "Hartley and Flather" at Leeds. Nom. cap.: £1,000 in £1 shares. Dirs.: H. Hartley, Buckton's Chambers, 57, Meadow Place, Leeds; A. D. Flather, 9, Market, Street, Bradford.
R. Mallinson and Sons, Limited. (468552.) 150B, Woodhouse Lane, Leeds. To carry on business of butter, lard, and fat importers, bacon factors, general provision merchants, etc. Nom. cap.: £100 in £1 shares. Permt. dirs.: H. C. Mallinson, 5, Spa Flats, The Grove, Ilkley; F. H. Mallinson, Morningside, Grove Road, Menston-in-Wharfedale, Yorks.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.

FOOD MANUFACTURE

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